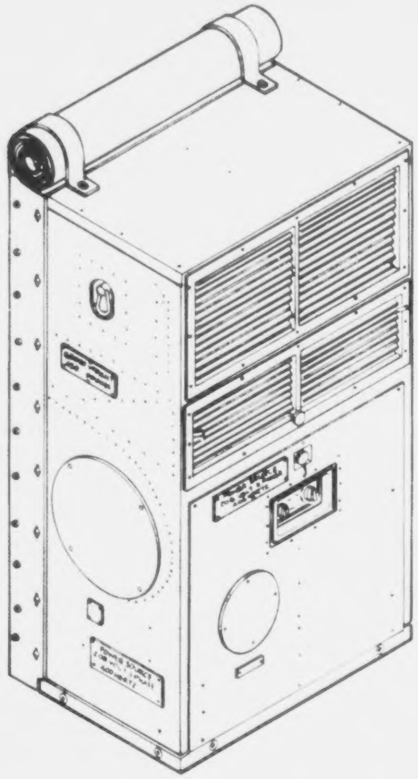
5-4120-370-14

TM 5-4120-370-14

TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL



AIR CONDITIONER, VERTICAL, COMPACT, 36,000 BTU/HR COOLING, 28,600 BTU/HR HEATING 208 VOLT, 3 PHASE, 400 HERTZ NSN 4120-01-110-2034

HEADQUARTERS
DEPARTMENT OF THE ARMY

16 MARCH 1983

This copy is a reprint which includes current pages from Change 1.

D 101.11:

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TM 5-4120-370-14
T.O. 35E9-229-1
C 1

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON, D.C., *30 January 1987*

Operator's, Organizational, Direct Support, and General Support Maintenance Manual

AIR CONDITIONER, VERTICAL, COMPACT, 36,000 BTU/HR COOLING, 28,600 BTU/HR HEATING

208 VOLT, 3 PHASE, 400 HERTZ
KECO MODEL F36T4-2S 4120-01-110-2034

208 VOLT, 3 PHASE, 400 HERTZ
KECO MODEL F36T4-2SA 4120-01-222-9310

208 VOLT, 3 PHASE, 50/60 HERTZ
KECO MODEL F36T-2S 4120-01-222-6438

TM 5-4120-370-14, 16 March 1983, is changed as follows:

1. Air Force T.O. 35E9-229-1, is being added to this manual.

2. Title is changed as shown above.

3. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
i through vi	i through vi
1-1 through 1-6	1-1 through 1-6
2-1 and 2-2	2-1 and 2-2
2-9 and 2-10	2-9 and 2-10
2-21 and 2-22	2-21 and 2-22
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4-63 through 4-66	4-63 through 4-66
4-69 and 4-70	4-69 and 4-70

4. Retain this sheet in front of manual for reference purposes.

READEX FICHE best copy available

By Order of the Secretaries of the Army, and the Air Force:

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General, USAF, Commander, Air Force
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DISTRIBUTION:
To be distributed in accordance with DA Form 12-25A, Operator, Organizational, Direct Support and General Support Maintenance requirements for Air Conditioner, Vertical Compact, 36,000 BTU Cool/28,600 BTU Heat, 208V, 400HZ, 3PH (F36T4-25)

WARNING

Acetone and methyl-ethyl ketone (MEK) are flammable, and their vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use a well-ventilated area, and keep away from sparks or flame. Use goggles, gloves, and apron when appropriate.

WARNING

Do not use steam to clean coil.

WARNING

Do not use steam, open flame, heat gun, or any other high-temperature heat source to thaw an iced coil. Thaw an iced coil by lamp bulb (75-watt maximum), operating unit in high heat mode, with a hair drier, electric fan, or by leaving the unit shut down until ice melts.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm²). Do not direct compressed air against the skin. Use goggles or full face shield.

WARNING

Avoid skin contact or inhaling fumes from any acid formed by burn out of oil and refrigerant. Wear gas mask if area is not thoroughly ventilated. Wear protective goggles or glasses to protect eyes. Wear rubber gloves to protect hands. Use care to avoid spilling compressor burn out sludge. If sludge is spilled, clean area thoroughly.

WARNING

Avoid injury by using adequate equipment and personnel to remove compressor from frame. The compressor weighs 85 pounds (38.6 kg).

WARNING

Clean parts in a well ventilated area.

Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly.

Dry cleaning solvent (Fed. Spec. P-D-680) used to clean parts is potentially dangerous to personnel and property.

Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

Wear eye protection when blowing solvent from parts. Air pressure should not exceed 30 psig (2.1 kg/cm²).

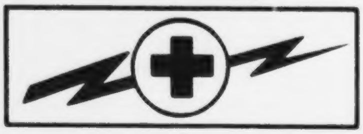
Assure the industrial process has been evaluated by the Medical Service Bioenvironmental Engineer.

Waste treatment/disposal must be approved by the Medical Service Bioenvironmental Engineer and Civil Engineer.

WARNING

Solutions will be disposed of in accordance with local State Water Pollution Control Laws. Consult local Medical Services for guidance.

WARNING



HIGH VOLTAGE

is used in the operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the input power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections of 208 volts ac input when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

Do not operate the equipment without all grilles, guards, louvers, and covers in place and tightly secured.

Warning: Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions.

WARNING

When possible, disconnect input power to the air conditioner before performing any maintenance to the electrical system. Voltages used can be deadly. Shutting the unit off at the control panel does not disconnect power to the various components of the air conditioner.

WARNING

Allow heaters to cool before touching. Severe burns can result from touching hot heaters.

WARNING

Do not allow anyone under equipment suspended from a lifting device.

Do not allow the unit to swing while suspended from a lifting device.

Failure to observe this warning may result in injury to personnel and damage to the equipment.

WARNING

- The covers, grilles, and screens installed on this unit are there for a purpose.
- Do not operate this unit with them off or open unless the instructions tell you to. When this is necessary, do so with care.

WARNING

The burning of polyurethane foams is dangerous.

Due to the chemical composition of a polyurethane foam, toxic fumes are released when it is burned or heated. If it is burned or heated indoors, such as during a welding operation nearby, you should take care to ventilate the area thoroughly. An exhaust system like that of a paint spray booth should be used.

Air-supplied respirators, approved by the National Institute for Occupational Safety and Health Administration or the United States Bureau of Mines, should be used for all welding in confined spaces and in places where ventilation is inadequate. Persons who have chronic or recurrent respiratory conditions, including allergies and asthma, should not work in these areas.

WARNING

DANGEROUS CHEMICAL
(Refrigerant 22)
is used in this equipment.

DEATH

or serious injury may result if personnel fail to observe proper safety precautions. Great care must be exercised to prevent contact of liquid refrigerant, or refrigerant gas discharged under pressure, with any part of the body. The extremely low temperature resulting from the rapid expansion of liquid refrigerant, or refrigerant gas released under pressure, can cause sudden and irreversible tissue damage through freezing. As a minimum, all personnel must wear thermal protective gloves and face shield or goggles when working in any situation where refrigerant contact with the skin or eyes is possible. Application of excessive heat to any component in a charged system will cause extreme pressure that may result in a rupture, possibly explosive in nature. Exposure of refrigerant 22 to an open flame or a very hot surface will cause a chemical reaction in the gas to form carbonyl chloride (phosgene), a highly poisonous and corrosive gas. In its natural state, refrigerant 22 is a colorless odorless vapor with no toxic characteristics. It is heavier than air and in a well ventilated area will disperse rapidly. However, in an unventilated area it presents danger as a suffocant.

WARNING

Be sure the refrigeration system is fully discharged and purged and that dry nitrogen is flowing through the system at the rate of less than 1-2 cfm (0.028-0.057 m^3/minute) before all brazing or debrazing operations.

TECHNICAL MANUAL
TM 5-4120-370-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 16 MARCH 1983

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR AIR CONDITIONER, VERTICAL, COMPACT, 36,000 BTU/HR COOLING 28,600 BTU/HR HEATING

208 VOLT, 3 Phase,	400 HERTZ
KECO MODEL F36T4-2S	4120-01-110-2034
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208 VOLTS, 3 PHASE,	50/60 HERTZ
KECO MODEL F36T-2S	4120-01-222-6438

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Troop Support Command, Attention: AMSTR-MCTS, 4300 Goodfellow Blvd., St. Louis, Missouri 63120-1798. A reply will be furnished to you.

Air Force: Completed AFTO Form 22 (Technical Order Publication Improvement Report and Reply) should be forwarded to HQ, SA-ALC/MMEDT, Kelly AFB, TX 78241.

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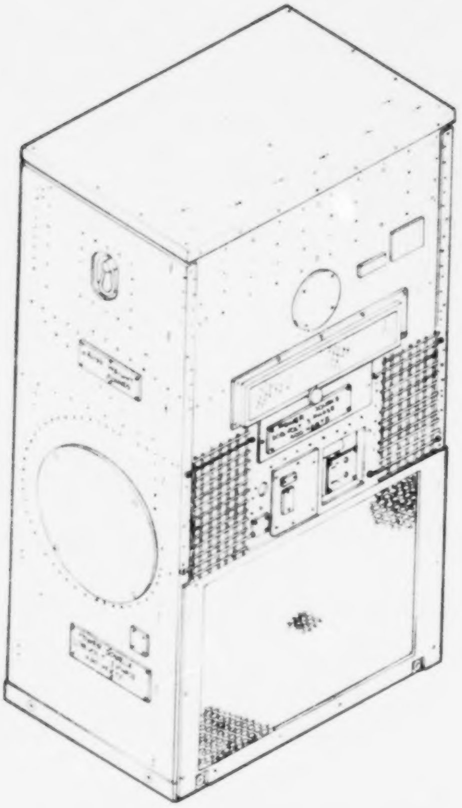
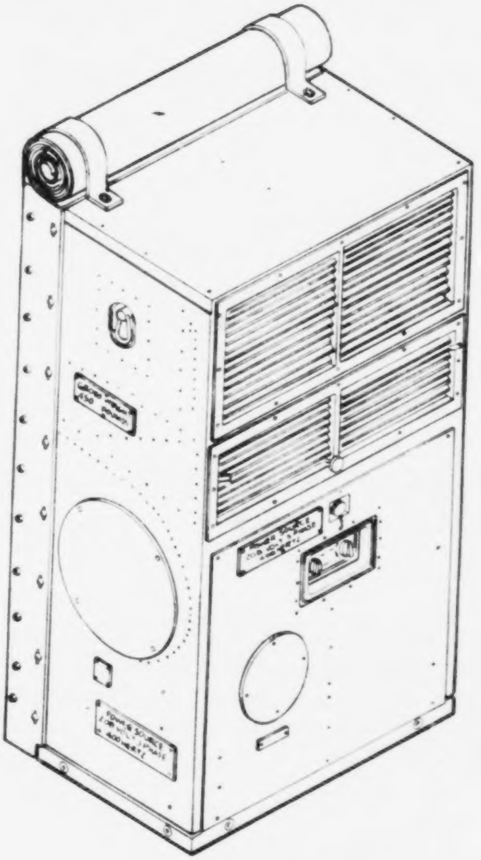


AIR CONDITIONER-REAR AND RIGHT SIDE VIEW (WITH FABRIC COVER REMOVED)



AIR CONDITIONER-FRONT AND LEFT SIDE VIEW

TS4120-370-14/1-1

Figure 1-1. Air Conditioner

CHAPTER 1

INTRODUCTION

Section I GENERAL INFORMATION

1-1. SCOPE

a. Type of Manual. Operator's, Organizational, Direct Support, and General Support Maintenance Manual.

b. Model Numbers and Equipment Names:

Keco Model F36T4-2S, Vertical, Compact, 36,000 BTU/HR Cooling, 28,600 BTU/HR Heating, 208 Volt, 3 Phase, 400 Hertz, Air Conditioner.

Keco Model F36T4-2SA, Vertical, Compact, 36,000 BTU/HR Cooling, 28,600 BTU/HR Heating, 208 Volt, 3 Phase, 400 Hertz, Air Conditioner.

Keco Model F36T-2S, Vertical, Compact, 36,000 BTU/HR Cooling, 28,600 BTU/HR Heating, 208 Volt, 3 Phase, 50/60 Hertz, Air Conditioner.

c. Purpose of Equipment. Cools, heats, and ventilates enclosed spaces. The unit covered by this manual is designed for cooling and heating air to a desired predetermined range and circulating the conditioned air to provide heating and cooling of equipment or personnel within the conditioned area.

1-2. MAINTENANCE FORMS AND RECORDS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM-738-750, The Army Maintenance Management System (TAMMS).

Air Force Personnel will use AFR 66-1 for maintenance reporting and TO-00-35D-54 for unsatisfactory equipment reporting.

1-3. HAND RECEIPT MANUAL

This manual has a companion document with a TM number followed by -HR (which stands for Hand Receipt). The TM 5-4120-370-14-HR consists of preprinted hand receipts (DA Form 2062) that list end item related equipment (i.e., COEI, BII, and AAL) you must account for. As an aid to property accountability, additional -HR manuals may be requisitioned from the following source in accordance with procedures in Chapter 3, AR 310-2:

The US Army Adjutant General Publications Center
ATTN: AGLD-OD
2800 Eastern Blvd.
Baltimore, Md 21220-2896

1-4. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR's)

If your Air Conditioner needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on a SF 368 (Quality Deficiency Report). Mail it to us at Commander, Headquarters, U.S. Army Troop Support Command, Attention: AMSTR-QX, 4300 Goodfellow Blvd., St. Louis, Missouri 63120-1798. We will send you a reply.

Air Force Personnel are encouraged to submit EIR's in accordance with Air Force Suggestion Program AFR 900-4.

1-5. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Command decisions, according to tactical situation, will determine when destruction of the air conditioning unit will be accomplished. A destruction plan will be prepared by the using organization, unless one has been prepared by higher authority. For general destruction procedures for this equipment, refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use.

1-6. PREPARATION FOR STORAGE OR SHIPMENT

Contact organizational maintenance for air conditioning unit preparation for storage or shipment. (See para 4-70.)

Section II EQUIPMENT DESCRIPTION

1-7. PURPOSE, CAPABILITIES, AND FEATURES

a. Purpose of Air Conditioner. The Air Conditioner is designed to ventilate, cool or heat, and to filter air in rooms or enclosures.

b. Capabilities and features

(1) Provides a maximum of 36,000 BTU/HR of cooling or 28,600 BTU/HR of heating.

(2) Has two stages of heat.

(3) Provides source of filtered outside (fresh) ventilation air.

(4) Is self contained in a single cabinet that is ideally suited for van, shelter, or room installations.

(5) Operates in environmental conditions from tropic to arctic.

(6) Is fully portable.

(7) Has connection point for a CBR (chemical, biological, radiological) filter.

(8) Has alternate power input connection locations to provide for a variety of installations.

(9) Designed for low-noise level operation.

c. Special features

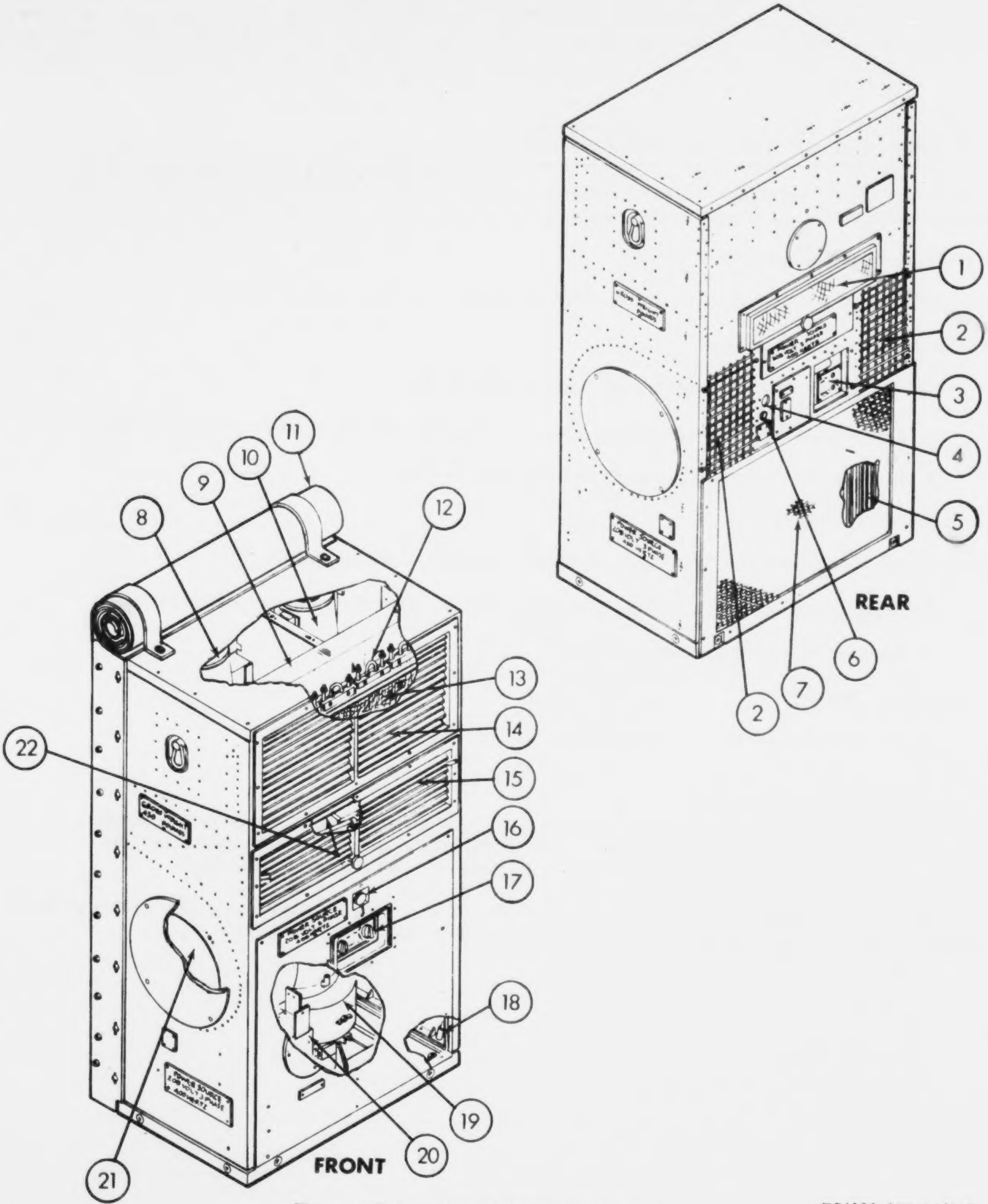
(1) The control panel may be removed from the unit and remote mounted.

NOTE

When control panel is remote mounted, a block off panel must be used on the air conditioner. The block off panel must be ordered separately. Interconnecting cables must also be fabricated. See installation instructions (para 4-11) for additional information.

(2) A sound attenuator is available for the conditioned air inlet and outlet connections on this air conditioner. It must be ordered separately. See paragraph 4-69 for additional information.

1-8. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS


1
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REAR
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21
22
FRONT

Figure 1-2. Location of Major Components

TS4120-370-14/1-2

1 FRESH AIR FILTER AND DAMPER—Provides filtered outside air.

2 CONDENSER AIR OUTLET GRILLES—Protects personnel from injury and fans from damage.

3 SAFETY CONTROL BOX ASSEMBLY—Contains HIGH and LOW PRESSURE CUTOUT switches (S5 and S6) and control circuit breakers (CB2 and CB3).

4 REFRIGERANT SIGHT GLASS (liquid sight indicator)—Allows visual inspection and indicates condition of liquid refrigerant when the unit is operating in the cool mode.

5 CONDENSER COIL—Serves as a heat exchanger by transferring heat from the refrigerant passing through the tubing to the air passing over the tubing and fins.

6 COMPRESSOR CIRCUIT BREAKER (CB1) RESET KNOB—Actuates a push-pull type control cable for resetting compressor circuit breaker.

7 CONDENSER COIL GUARD—Protects coil from damage.

8 LEFT EVAPORATOR FAN AND MOTOR—Draws air into the evaporator section and exhausts it through the evaporator (cooling) coil and heater elements into the room or enclosure.

9 EVAPORATOR COIL—Serves as a heat exchanger by transferring heat from the air passing over the tubing and fins to the refrigerant passing through the tubing.

10 RIGHT EVAPORATOR FAN AND MOTOR—Draws air into the evaporator section and exhausts it through the evaporator (cooling) coil and heater elements into the room or enclosure.

11 FABRIC COVER—Shown in stowed (operational) position. When rolled down and snapped it protects the rear (exposed) surface of the unit.

12 HEATER ELEMENTS—Consists of two banks of three elements each. Only one bank operates in the LO HEAT mode. Both banks operate in the HI HEAT mode, however, the TEMPerature control thermostat controls only one bank.

13 MIST ELIMINATOR—Prevents condensate (water) from being blown from the coil into the room or enclosure.

14 CONDITIONED AIR DISCHARGE GRILLE—Adjustable louvers allow directional control of conditioned air.

15 INTAKE (RETURN) AIR GRILLE—Adjustable louvers allow control of outside (fresh) and return (from room or enclosure) air.

16 INPUT POWER RECEPTACLE—For connection of external power source cable.

NOTE

The air conditioner is designed so that the input power receptacle may be used in the front panel location shown, or it may be moved to one of four other alternative locations. See installation instructions (para 4-9).

17 CONTROL PANEL—Contains a five position mode selector switch and a TEMPerature control thermostat.

NOTE

The control panel is shown in its location when the air conditioner is installed as a self-contained unit. The control panel is designed so that it may be removed from the cabinet and installed in a remote location. See installation instructions (para 4-7).

18 CONDENSATE WATER DRIP PAN AND DRAIN TRAP—The drip pan is located directly below the evaporator coil and mist eliminator and is built into the casing. Its purpose is to collect condensate that drips off the evaporator coil and mist eliminator during cooling operations. Condensate water then flows through tubing to the drain trap located inside the lower right hand front corner of the cabinet. The drain trap is a check valve that prevents air flow between the condenser and evaporator sections through the drain tubing.

19 COMPRESSOR—Pumps refrigerant through the system during cooling operations.

20 JUNCTION BOX—Contains and protects electrical system control devices.

21 CONDENSER AIR FANS AND MOTOR ASSEMBLY—Draws air through the condenser coil and discharges the heated air back to the outside during cooling operations.

22 CONDITIONED AIR FILTER—Provides filtered return air.

1-9. DIFFERENCES BETWEEN MODELS

Keco Industries, Inc. Models F36T4-2S and F36T4-2SA are 208 volt, 400 hertz, 3 phase air conditioners and are identical except for minor design improvements made to theF36T4-2SA unit.

Keco Industries, Inc. Model F36T-2S has 208, 50/60 hertz, 3 phase power.

Modified versions of Keco Models F36T4-2SA and F36T-2S are used by the Air Force in support of the AN/TSQ-111, communications Nodal Control Element. This tech manual/tech order covers the basic air conditioner before modification. For modification procedures and/or additional information refer to T.O. 31S1-2TSQ111-2-1 and T.O. 31S1-2TSQ111-4.

1-10. PERFORMANCE DATA

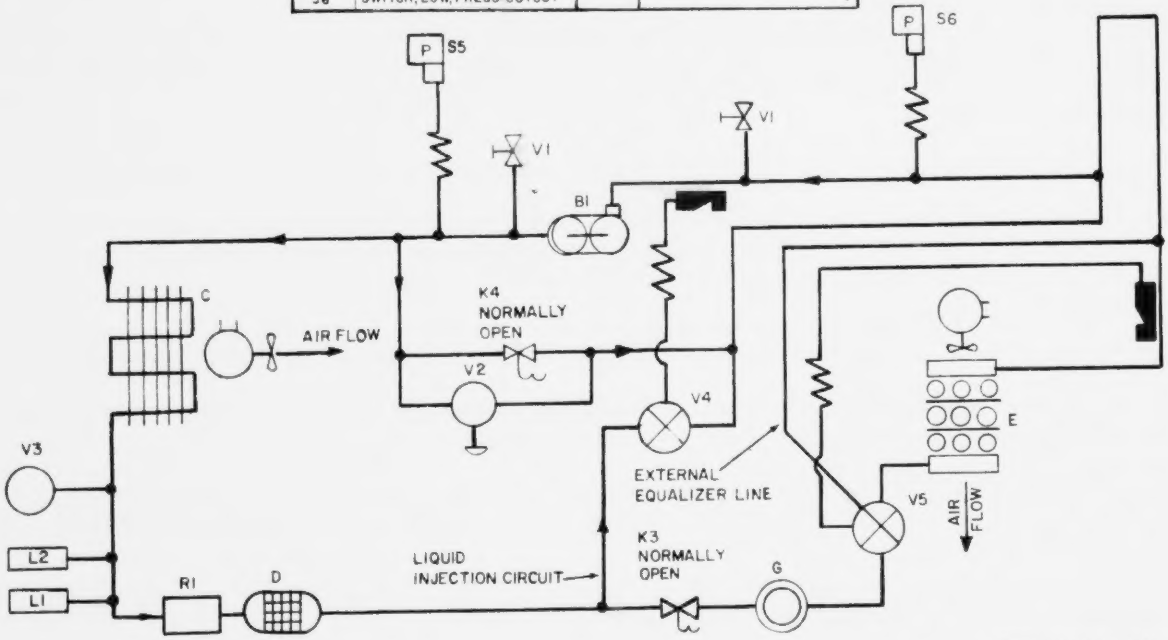
OPERATING TEMPERATURES	
LOW	-50°F (-45°C)
HIGH	+125°F (+52°C)
PERFORMANCE	
COOLING CAPACITY	36,000 Btu/hr
HEATING CAPACITY	28,600 Btu/hr
POWER REQUIRED	
VOLTAGE	208
PHASE	3
HERTZ	400 (F36T4-2S and F36T4-2SA) 50/60 (F36T-2S)
AMPERAGE	48
DIMENSIONS	
WIDTH	30.75 in. (78.1 cm)
DEPTH	21.50 in. (54.6 cm)
HEIGHT	55.36 in. (140.6 cm)
WEIGHT	450 pounds (204.1 kg)
REFRIGERANT	
TYPE	R-22
CHARGE	6 pounds (2.7 kg)

Section III TECHNICAL PRINCIPLES OF OPERATION

1-11. REFRIGERATION CYCLE

LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
B1	COMPRESSOR ,RECIP PDVN	V1	VALVE, ANGLE
C	COIL, CONDENSER	V2	VALVE, PRESS. REGULATING
D	DEHYDRATOR, DESICCANT	V3	VALVE, PRESSURE RELIEF
E	COIL, EVAPORATOR	V4	VALVE, EXPANSION
G	INDICATOR, SIGHT, LIQUID	V5	VALVE, EXPANSION
K3 K4	VALVE, SOLENOID	L1	LINEAR ACTUATING CYLINDER
R1	TANK, RECEIVER	L2	LINEAR ACTUATING CYLINDER
S5	SWITCH, HIGH PRESS, CUTOUT		
S6	SWITCH, LOW, PRESS CUTOUT		



TS4120-370-14/1-3

Figure 1-3. Refrigeration Schematic

a. Cooling cycle—Unit operation with mode selector switch set on COOL and the TEMPerature control thermostat set to DECREASE.

- Compressor (B1) starts.
- To prevent compressor overload and damage during startup, solenoid valve (K4) is open at start of cooling cycle to equalize pressure on both sides of the compressor.
- The compressor (B1) takes cold, low pressure refrigerant gas and compresses it to a high temperature, high pressure gas. This gas flows through the metal tubing to the condenser coil (C) and receiver (R1).
- The condenser fans draw outside ambient air over and through the condenser coil (C). The high temperature, high pressure gas from the compressor (B1) is cooled by the flow of air and is changed into a high pressure liquid.

- The refrigerant desiccant dehydrator (filter drier) (D) removes any moisture (water vapor) or dirt that may be carried by the liquid refrigerant.

- The liquid indicator (sight glass) (G) indicates the presence of moisture and quantity of refrigerant in the system.

- The solenoid valve (K3) is controlled by the TEMPerture control thermostat on the control panel. This valve will shut off the flow of refrigerant to the evaporator section when the temperature in the conditioned area reaches the set point.

- The expansion valve (V5) controls the amount and pressure of liquid refrigerant to the evaporator coil (E). The expansion valve (V5) senses the temperature and pressure of the refrigerant as it leaves the evaporator coil. By use of a sensing bulb and "external equalizer line" the valve constantly adjusts the flow of liquid refrigerant to the evaporator coil (E).

- As the liquid refrigerant leaves the expansion valve (V5) it passes thru a distributor and enters the evaporator coil (E). As the liquid enters the coil at a reduced pressure, the reduction in pressure and the warmer air being forced across the tubes of the coil cause the refrigerant to boil and change to a gas (vapor). The evaporator fans circulate the warm air from the conditioned space over and through the evaporator coil. Refrigerant absorbs heat when it changes from a liquid to a gas. As the air from the conditioned spaces comes in contact with evaporator coil (E), the air is cooled.

- The refrigerant gas is then drawn back to the compressor (B1) and the cycle is repeated.

b. Bypass cycle. This unit has a bypass cycle which allows cooling operation at low cooling loads without cycling the compressor (B1) on and off. In bypass, the refrigerant is piped from the discharge (high side) to the suction (low side) of the compressor, bypassing the evaporator coil (E).

- When the TEMPerature control thermostat on the control panel senses that cooling conditions have reached the set point, it closes the solenoid valve (K3) to shut off refrigerant flow to the evaporator coil (E).

- As the compressor suction pressure starts to drop, the pressure regulating valve (V2) opens to allow flow of hot gas from the compressor.

- The liquid quench expansion valve (V4) senses the temperature of the gas at the suction side of the compressor. To prevent excessively hot gas from reaching the compressor, the liquid quench expansion valve (V4) opens to allow liquid refrigerant to mix with the hot gas.

- The linear actuating cylinders (L1 and L2) automatically control the condenser air discharge louver assemblies to maintain an adequate discharge pressure.

- The service valves (V1) are provided for charging, and general servicing of the high and low pressure sides of the refrigerant system.

- The low pressure switch (S6), the high pressure switch (S5), and the pressure relief valve (V3) are provided to protect the unit from damage due to pressure extremes.

1-12. HEATING

a. HI HEAT mode. When the mode selector switch is set for HI HEAT the six heating elements, located in front of the evaporator coil, are energized. These elements are protected from overheating by a thermal cutout switch. Three of the elements are thermostatically controlled by the TEMPerature control thermostat, and remaining three are on all of the time.

b. LO HEAT mode. When the mode selector switch is set for LO HEAT, only the three thermostatically controlled heating elements are used.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. GENERAL

The Model F36T4-2S, F36T4-2SA and F36T-2S Air Conditioners are designed for a variety of installations and for operation under a wide range of climatic conditions. They are also designed for continuous or intermittent operation as self-contained units or may be connected to or used with external filtering equipment for operation under chemical-biological-radiological (CBR) environmental conditions. Operators must be aware of any peculiarities or operational limitations for their specific installation. See the appropriate shelter or system manual for instructions peculiar to your specific installation.

2-2. OPERATOR'S CONTROLS

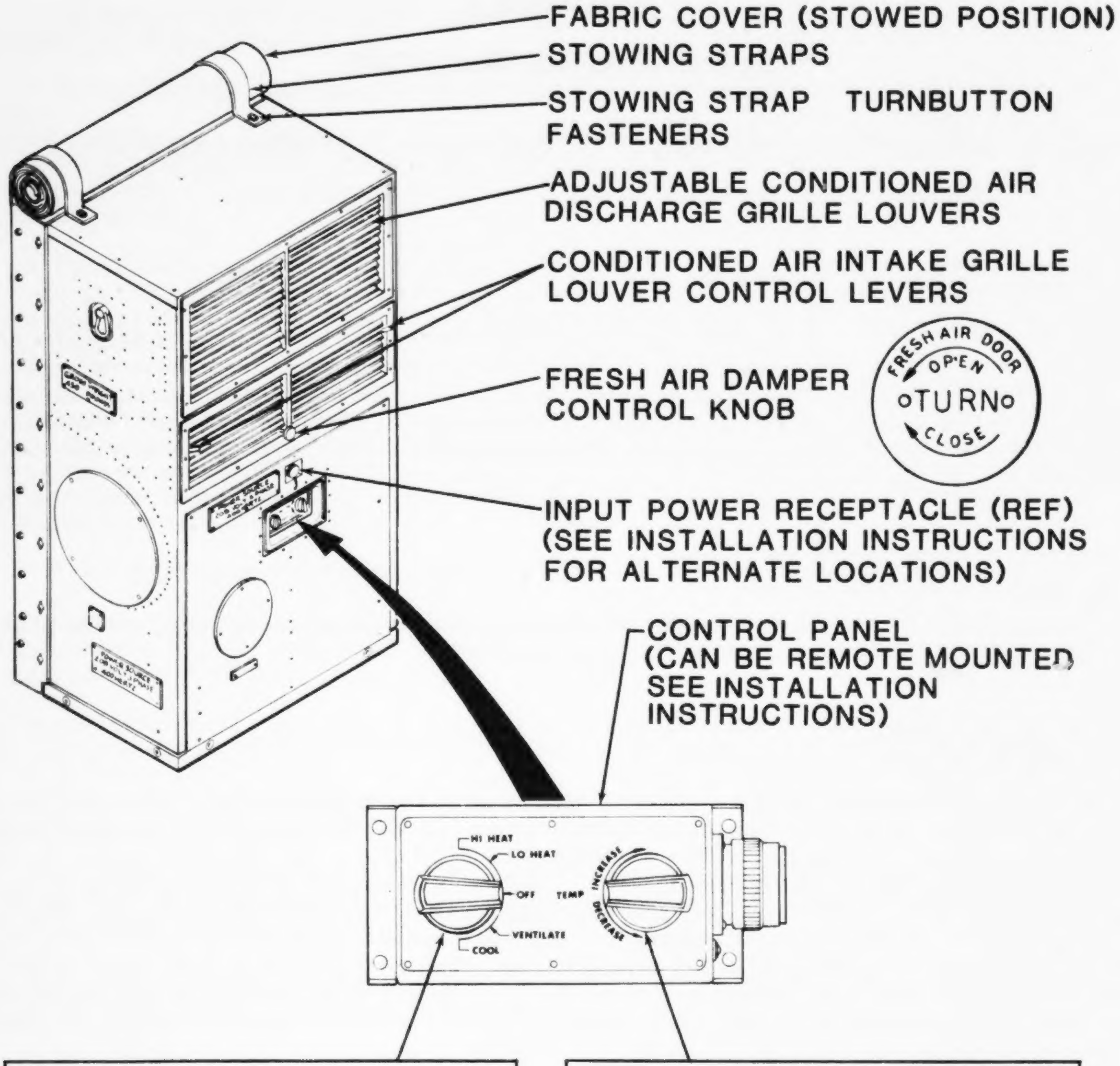
See figures 2-1 and 2-2 for a general description of the controls that an operator will normally be concerned with. For specific operating instructions, see Sections III and IV of this chapter.

2-3. INDICATORS

The refrigerant sight glass (fig. 2-2) is the only visual indicator used. The sight glass is a port or window through which the refrigerant condition can be seen. Liquid refrigerant actually flows through the sight glass chamber only during cooling cycles when the air conditioner is in operation in the COOL mode. The unit must be operated approximately 15 minutes at maximum cooling prior to checking condition of refrigerant at sight glass. The sight glass is equipped with a center indicator that is moisture sensitive. Dry refrigerant is indicated by green, it turns to chartreuse when the moisture content becomes undesirable, and to yellow when the level becomes unacceptable. Excessive moisture in the refrigerant may damage or possibly destroy the compressor. If the liquid refrigerant observed in the sight glass has an opaque, milky appearance, or frequent bubbles appear, the volume of refrigerant is low and the system should be charged. Either moisture or low charge indications should be reported to direct support maintenance.

CAUTION

Do not operate the air conditioner in the COOL mode if the refrigerant color has reached the yellow band or if numerous bubbles appear in the sight glass. COOL mode operation may be continued with the refrigerant color in the chartreuse band or with only an occasional bubble appearing in the window, but the sight glass should be rechecked after each four hours of operation to insure that the condition has not become worse


FABRIC COVER (STOWED POSITION)
STOWING STRAPS
STOWING STRAP TURNBUTTON FASTENERS
ADJUSTABLE CONDITIONED AIR DISCHARGE GRILLE LOUVERS
CONDITIONED AIR INTAKE GRILLE LOUVER CONTROL LEVERS
FRESH AIR DAMPER CONTROL KNOB
FRESH AIR DOOR
OPEN
TURN
CLOSE
INPUT POWER RECEPTACLE (REF) (SEE INSTALLATION INSTRUCTIONS FOR ALTERNATE LOCATIONS)
CONTROL PANEL (CAN BE REMOTE MOUNTED SEE INSTALLATION INSTRUCTIONS)
HI HEAT
LO HEAT
OFF
VENTILATE
COOL
TEMP
INCREASE
DECREASE

MODE SELECTOR SWITCH

TURN KNOB TO DESIRED MODE

- COOL- FOR COOLING
- HI OR LO HEAT-FOR HEATING
- VENTILATE-FOR FAN ONLY OPERATION
- OFF-TO SHUT UNIT DOWN

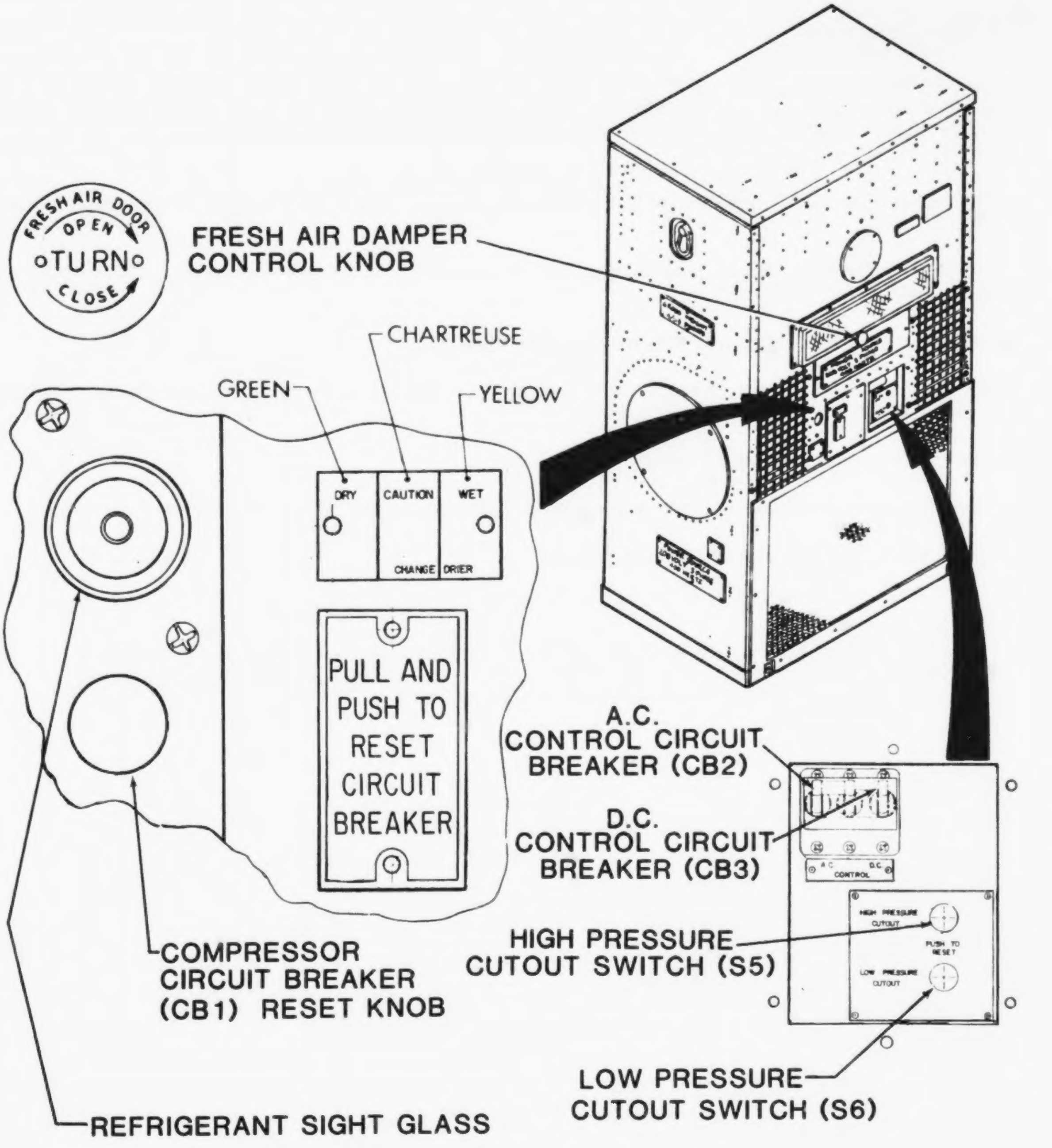
TEMPERATURE CONTROL THERMOSTAT

TURN KNOB TO ADJUST LEVEL OF COOLING OR HEATING

- CLOCKWISE TO INCREASE (WARMER)
- COUNTERCLOCKWISE TO DECREASE (COOLER)

TS4120-370-14/2-1

Figure 2-1. Operator's Controls Front


FRESH AIR DOOR
OPEN
TURN
CLOSE
FRESH AIR DAMPER CONTROL KNOB
CHARTREUSE
GREEN
YELLOW
DRY
CAUTION
WET
CHANGE DRIER
PULL AND PUSH TO RESET CIRCUIT BREAKER
A.C. CONTROL CIRCUIT BREAKER (CB2)
D.C. CONTROL CIRCUIT BREAKER (CB3)
A.C.
D.C.
CONTROL
HIGH PRESSURE CUTOUT
PUSH TO RESET
LOW PRESSURE CUTOUT
HIGH PRESSURE CUTOUT SWITCH (S5)
LOW PRESSURE CUTOUT SWITCH (S6)
COMPRESSOR CIRCUIT BREAKER (CB1) RESET KNOB
REFRIGERANT SIGHT GLASS

TS4120-370-14/2-2

Figure 2-2. Operator's Controls Rear

Section II OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-4. GENERAL

Preventive Maintenance Checks and Services (PMCS) are essential to the efficient operation of the air conditioner and to prevent possible damage that might occur through neglect or failure to observe warning symptoms in a timely manner. Checks and services performed by operators are limited to those functions which are described in table 2-1.

a. Before You Operate. Always keep in mind and observe the WARNINGS and CAUTIONS. Perform your before (B) PMCS.

b. While You Operate. Always keep in mind and observe the WARNINGS and CAUTIONS. Perform your during (D) PMCS.

c. After You Operate. Be sure to perform your after (A) PMCS.

d. If Your Equipment Fails to Operate, Troubleshoot with proper equipment. Report any deficiencies using DA form 2404. See TM 38-750 for instructions.

e. Perform weekly as well as before operations PMCS if:

(1) You are the assigned operator and have not operated the item since the last weekly.

(2) You are operating the item for the first time.

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

Table 2-1.
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B-Before D-During A-After W-Weekly M-Monthly

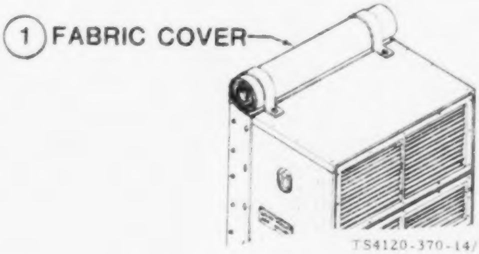
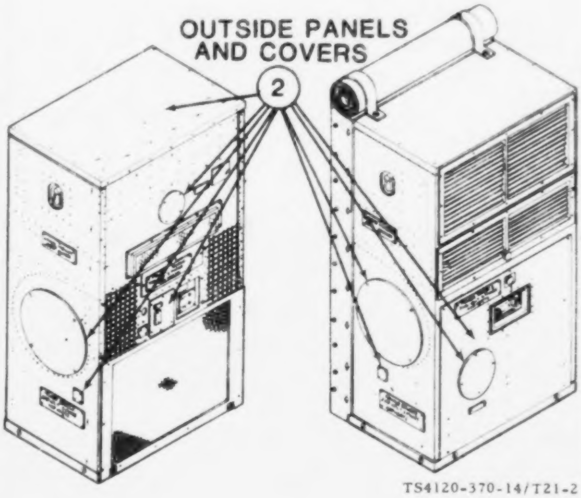
Item No.	B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE	Equipment is Not Ready/Available If:
1	●					*Fabric Cover* Check that cover is rolled up for normal operation.	
					●	Roll cover down and check for condition of snaps, tears or worn edges, and mildew.  TS4120-370-14/T21-1	
2	●					*Outside Covers and Panels* Check that panels are in place. Check panels for cracks, dents, and missing hardware.  TS4120-370-14/T21-2	Panels missing or damage that would cause operating hazard.

Table 2-1.
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (Cont)

B-Before D-During A-After W-Weekly M-Monthly

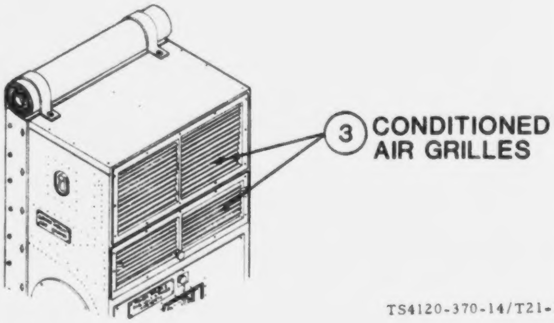
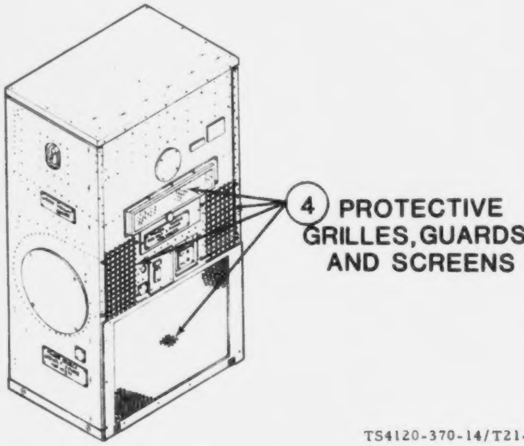
Item No.	B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE	Equipment is Not Ready/Available If:
3						*Conditioned Air Grilles*	
	●					Check for obstructions, damage, proper adjustment, loose, or missing hardware.	
				●		Check louvers for freedom of operation. Lubricate as required.  TS4120-370-14/T21-3	
4						*Protective Grilles, Guards, and Screens*	
	●					Check that grilles, guards, and screens are in place.	Missing parts or damage that would cause operating hazards.
	●			●		Check them for obstructions, damage, and loose or missing hardware.  TS4120-370-14/T21-4	

Table 2-1.
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (cont.)

B-Before D-During A-After W-Weekly M-Monthly

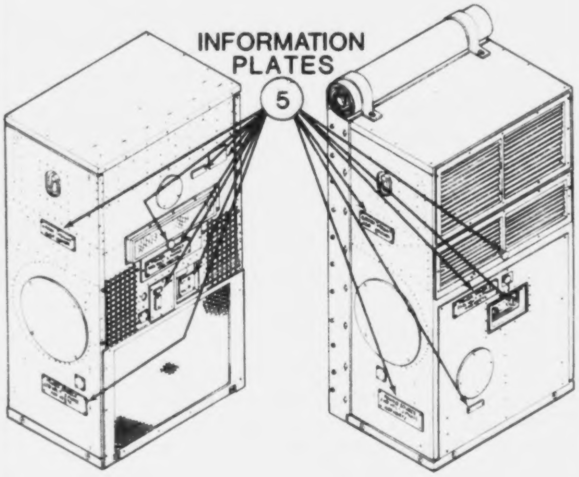
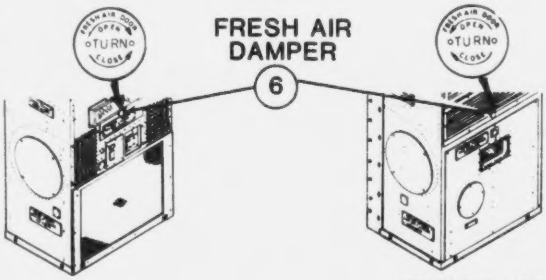
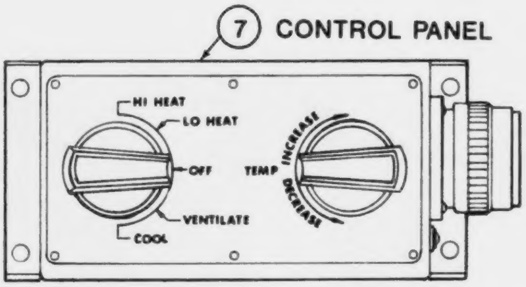
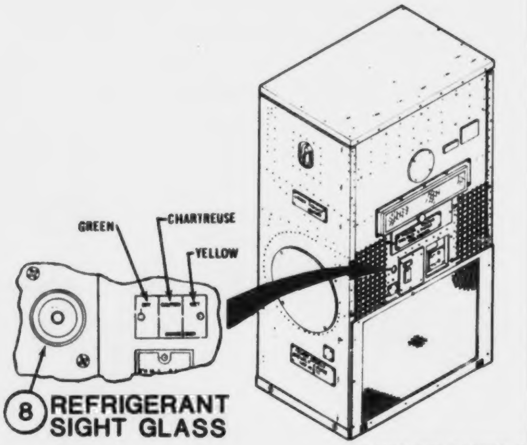
Item No.	B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE	Equipment is Not Ready/Available If:
5		•				*Information Plates* Check for legibility and loose or missing hardware.  INFORMATION PLATES 5 TS4120-370-14/T21-5	
6	•	•				*Fresh Air Damper* Check for proper adjustment.	
					•	Check for freedom of operation.  FRESH AIR DAMPER 6 FRESH AIR DOOR OPEN TURN CLOSE FRESH AIR DOOR OPEN TURN CLOSE TS4120-370-14/T21-6	Control knob(s) missing or inoperable.

Table 2-1.
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (cont.)

B-Before D-During A-After W-Weekly M-Monthly

Item No.	B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE	Equipment is Not Ready/Available If:
7	•					*Control Panel* Check for obvious damage and missing knobs.	Control panel damaged.
		•				Check for proper operation.	Unit not operating properly.
						 7 CONTROL PANEL HI HEAT LO HEAT OFF VENTILATE COOL TEMP INCREASE DECREASE TS4120-370-14/T21-7	
8		•			•	*Refrigerant Sight Glass* After 15 minutes of operation in maximum cooling, check for bubbles or milky flow indicating low refrigerant charge. Check for yellow color which indicates presence of moisture.	Bubbles, milky flow, or yellow color is observed.
						 GREEN CHARTREUSE YELLOW 8 REFRIGERANT SIGHT GLASS TS4120-370-14/T21-8	

Section III OPERATION UNDER USUAL CONDITIONS

2-5. ASSEMBLY AND PREPARATION FOR USE

Services of organizational maintenance should be employed for original unpacking, assembly installation, and preparation for use. See paragraphs 4-2 through 4-12.

2-6. INITIAL ADJUSTMENTS AND CHECKS

a. Inspect all covers, panels, grilles, and screens for loose mounting, obstructions, or shipping damage. Report any deficiencies to organizational maintenance.

b. Perform the preventive maintenance checks and services listed in table 2-1.

2-7. GENERAL OPERATING PROCEDURES

a. Before operation

(1) Check to see that power cable has been connected to a source of 208 volt, 3 phase, 4 wire, 400 hertz power for models F36T4-2S and F36T4-2SA or 208 volt, 3 phase, 4 wire, 50/60 hertz power for model F36T-2S, and to the input power connector on the unit.

NOTE

When possible power should be connected to the unit at least 30 minutes prior to operating in the COOL mode. This is critical when outside temperatures are cold and unit is to be operated in the COOL mode. The compressor is equipped with a warm up heater and thermostat that will not allow the compressor to operate prior to complete warm up.

The unit will operate immediately (fans only) in the COOL mode. The refrigeration system (compressor) will operate only when warm up is complete (less than 30 minutes). If additional cooling is required fresh air damper can be opened. When compressor reaches safe operating temperature it will start automatically. Fresh air damper and TEMPerature control thermostat can then be adjusted to suit.

The compressor is also equipped with a heater that will keep it warm so long as unit remains connected to the power source.

(2) Check that fabric cover has been unsnapped, rolled up, and secured with both straps to the two turnbutton fasteners.

CAUTION

Under normal operating conditions, before starting the air conditioner in any mode, make sure that the fabric condenser cover on the back of the condenser section is rolled up and secured and that all screens and guards are in place and unobstructed.

EXCEPTION:

Under extreme cold climatic conditions, such as blowing snow, or freezing rain which might enter and damage condenser section, the unit may be operated in the VENTILATE, LO HEAT, or HI HEAT modes with the fabric cover rolled down and snapped in place.

DO NOT OPERATE IN THE COOL MODE
WITH THE FABRIC COVER ROLLED DOWN.

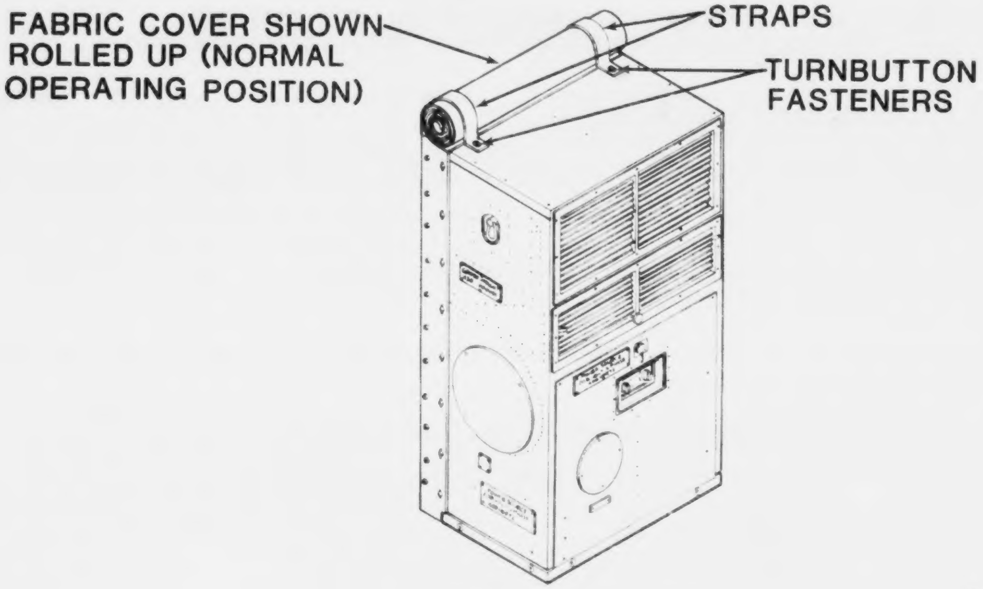
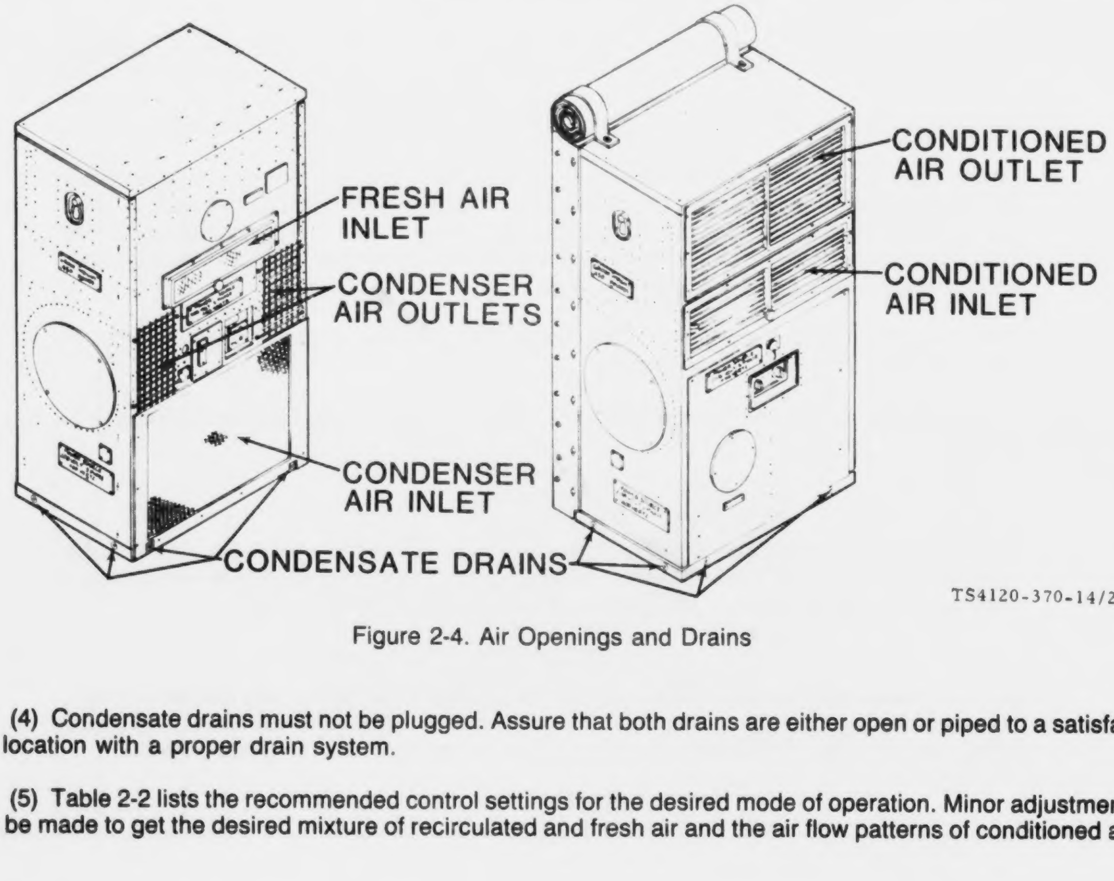

FABRIC COVER SHOWN ROLLED UP (NORMAL OPERATING POSITION)
STRAPS
TURNBUTTON FASTENERS

Figure 2-3. Fabric Cover

TS4120-370-14/2-3

(3) Check that all air inlet and outlet openings are clear.


FRESH AIR INLET
CONDENSER AIR OUTLETS
CONDENSER AIR INLET
CONDENSATE DRAINS
CONDITIONED AIR OUTLET
CONDITIONED AIR INLET

TS4120-370-14/2-4

Figure 2-4. Air Openings and Drains

(4) Condensate drains must not be plugged. Assure that both drains are either open or piped to a satisfactory location with a proper drain system.

(5) Table 2-2 lists the recommended control settings for the desired mode of operation. Minor adjustments may be made to get the desired mixture of recirculated and fresh air and the air flow patterns of conditioned air.

Table 2-2. Operator Control Settings

Mode	Mode Selector Switch	Temperature Control Thermostat	Fresh Air Damper	Conditioned Air Intake Grille	Conditioned Air Discharge Grille	Fabric Cover
Ventilate with 100% recirculated air	VENTILATE	Does not operate	Closed	Open	Adjust to suit	Rolled up or snapped closed
Ventilate with make-up (fresh air)	VENTILATE	Does not operate	Open	Open	Adjust to suit	Rolled up and secured
Ventilate with 100% fresh air	VENTILATE	Does not operate	Open	Closed	Adjust to suit	Rolled up and secured
Heating with 100% recirculated air	LO HEAT OR HI HEAT	Desired temperature	Closed	Open	Slightly down for best results	Rolled up or snapped closed
Heating with make-up (fresh air)	LO HEAT OR HI HEAT	Desired temperature	Open	Closed	Slightly down for best results	Rolled up and secured
Cooling with 100% recirculated air	COOL	Desired temperature	Closed	Open	Slightly up for best results	Rolled up and secured
Cooling with make-up (fresh air)	COOL	Desired temperature	Open	Open	Slightly up for best results	Rolled up and secured
Any mode with make-up air through CBR filter	Desired mode	Desired temperature	Closed and sealed	Partially closed	Adjust to suit	Rolled up and secured

b. General information (To increase comfort and save energy.)

(1) During **warm** or **cold** weather. (Air conditioner operation in COOL or HEAT modes.)

- Limit traffic through doors as much as possible.
- Keep doors and windows tightly closed.
- Limit use of fresh (outside) air.

NOTE

It is normally better to keep the fresh air damper **slightly** open. This will create a slight overpressure, provide replacement oxygen, and reduce room odors. Damper should be closed during extreme weather conditions and during periods when fast warm up or cooling is necessary.

Fresh air cannot be admitted if the fabric cover is rolled down.

- Do not adjust controls unnecessarily. Properly set the controls (See para 2-8 through 2-11.) and the unit will automatically control the temperature.
- The TEMPerature control thermostat on the control panel operates like conventional room thermostat except that the temperature scale is not marked on the control panel. The thermostat has a control range of 40°F to 90°F (5°C to 32°C). The centered position of the control knob would be approximately 65°F (18°C). The full INCREASE would be 90°F (32°C). The full DECREASE would be 40°F (5°C).
- When the control panel is mounted in the unit the control temperature is sensed at the conditioned air inlet.
- When the control panel is mounted in a remote location (away from the unit) the temperature is sensed at that location.

(2) During **cold** weather

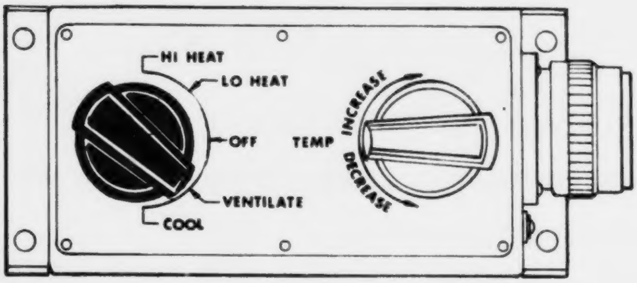
- Adjust shades, blinds, etc. (**when applicable**) to admit sunlight during day. Close them at night.
- Adjust the conditioned air outlet dampers slightly downward.

(3) During **hot** weather

- Adjust shades, blinds, etc. (**when applicable**) to block out sunlight during day.
- Adjust the conditioned air outlet dampers slightly upward.

2.8 OPERATION IN VENTILATE MODE (No Heating or Cooling Needed)

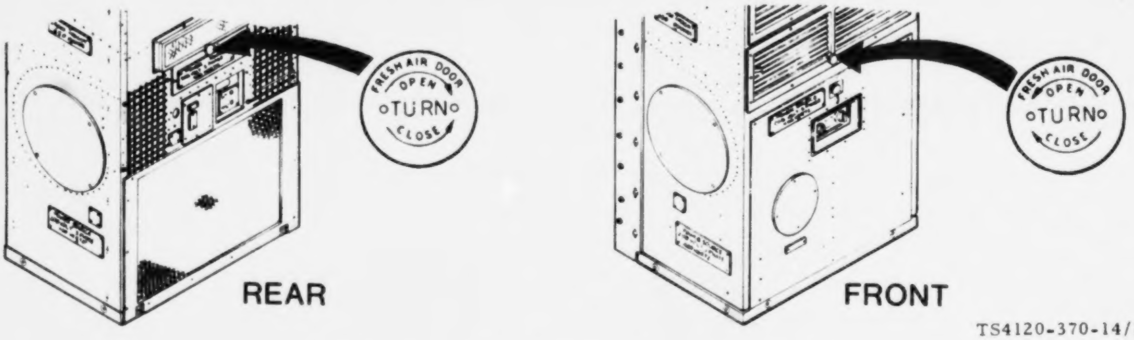
a. Turn mode selector switch to VENTILATE.



TS4120-370-14/2-5

Figure 2-5. VENTILATE Control Setting

b. Adjust fresh air damper to desired setting. The unit can be operated in the VENTILATE mode with the fresh air damper (door) closed, open, or partially open.


FRESH AIR DOOR
OPEN
TURN
CLOSE
REAR
FRESH AIR DOOR
OPEN
TURN
CLOSE
FRONT

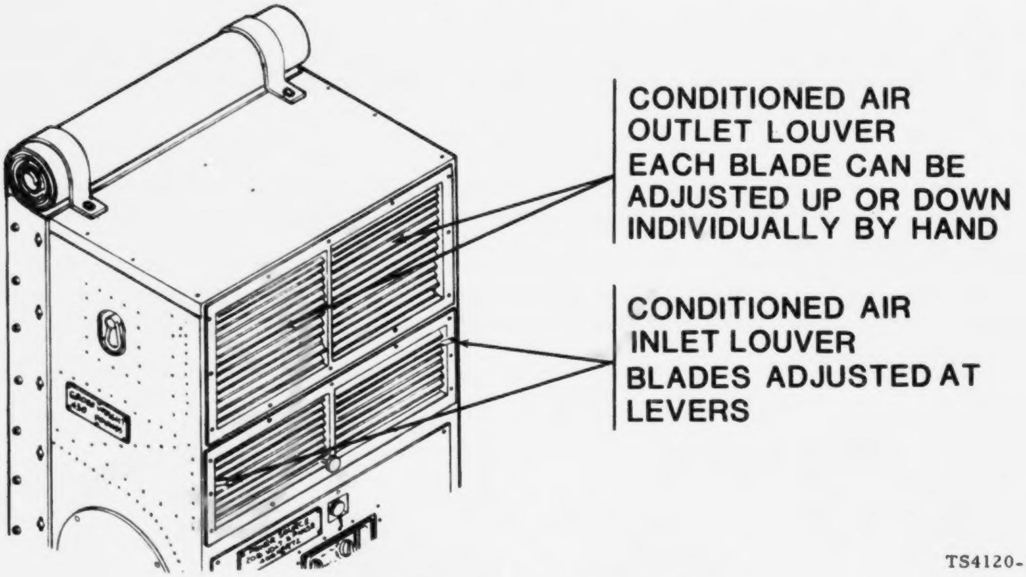
TS4120-370-14/2-6

Figure 2-6. Fresh Air Damper (Door) Adjustment

NOTE

The fabric cover must be rolled up and secured if fresh air damper (door) is to be opened. When using fresh air for ventilation a window, door, or vent should be opened. If the room or enclosure is tightly closed, an overpressure will build up and decrease the volume of fresh air drawn in.

c. Adjust louvers to suit


CONDITIONED AIR
OUTLET LOUVER
EACH BLADE CAN BE
ADJUSTED UP OR DOWN
INDIVIDUALLY BY HAND
CONDITIONED AIR
INLET LOUVER
BLADES ADJUSTED AT
LEVERS

TS4120-370-14/2-7

Figure 2-7. Louver Adjustment

NOTE

To pull in maximum of fresh (outside) air, close conditioned air inlet louvers.

2-9. OPERATION IN LO HEAT MODE

In the LO HEAT mode three thermostatically controlled heaters are activated.

a. Turn mode selector switch to LO HEAT.

b. Turn TEMPerature control thermostat knob as far as it will go in the INCREASE (warmer) position.

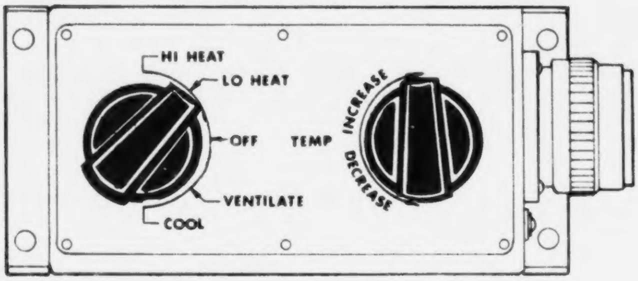


Figure 2-8. LO HEAT Control Setting

TS4120-370-14/2-8

NOTE

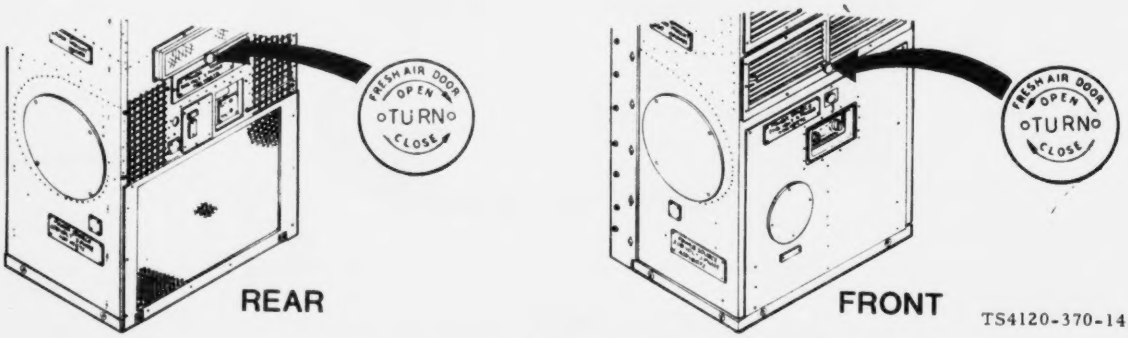
For faster warmer up, start unit in HI HEAT mode. In moderate temperatures, unit can then be switched back to LO HEAT.

c. When room or enclosure temperature reaches the desired level, **slowly** turn the TEMPerature control thermostat knob toward DECREASE. Heating will stop when you reach the approximate room temperature. Further adjustment can be made by turning the TEMPerature control thermostat knob **slightly** toward INCREASE (warmer) or DECREASE (cooler) until desired temperature is controlled automatically.

NOTE

- Should unit fail to heat the room or enclosure to the desired temperature or fail to maintain the desired temperature with TEMPerature control thermostat set in maximum INCREASE position, switch to HI HEAT.

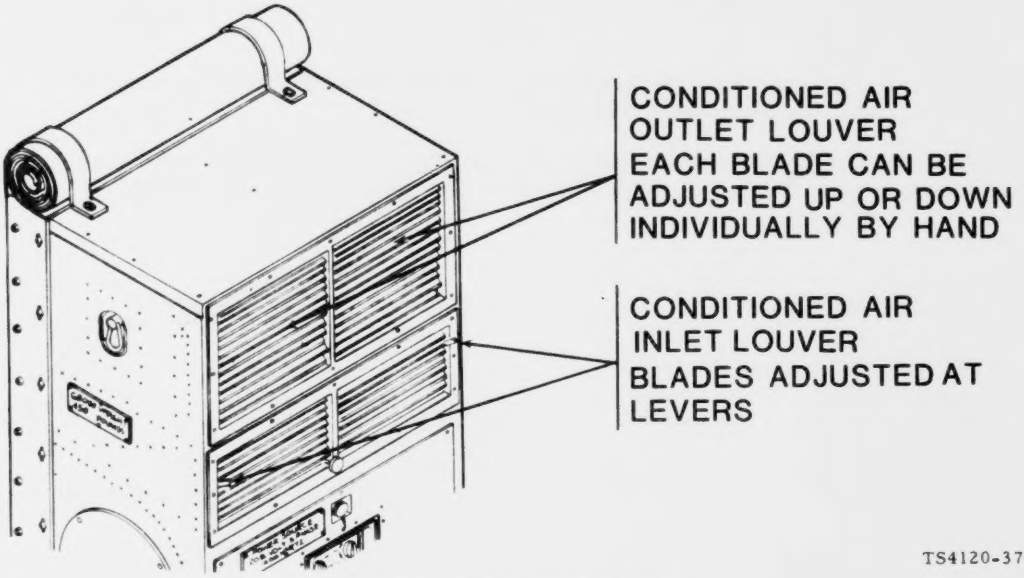
d. Adjust fresh air damper (door) to desired setting. It is normally better to keep the fresh air damper **slightly** open. Damper should be closed during very cold weather and during fast warmup periods.



TS4120-370-14/2-9

Figure 2-9. Fresh Air Damper (Door) Adjustment

e. Adjust louvers to suit. Since warm air tends to rise, it is normally better to adjust the conditioned air outlet louvers slightly downward. The conditioned air inlet louvers should be full open.


CONDITIONED AIR OUTLET LOUVER EACH BLADE CAN BE ADJUSTED UP OR DOWN INDIVIDUALLY BY HAND
CONDITIONED AIR INLET LOUVER BLADES ADJUSTED AT LEVERS

TS4120-370-14/2-10

Figure 2-10. Louver Adjustment

NOTE

An overheat thermostat located near the heating elements will turn them off if the temperature in the heater compartment reaches an excessive level.

2-10. OPERATION IN HI HEAT MODE

In the HI HEAT mode, six heaters are activated. Three are thermostatically controlled. Three operate all of the time.

a. Turn mode selector switch to HI HEAT.

b. Turn TEMPerature control thermostat knob as far as it will go in the INCREASE (warmer) position.

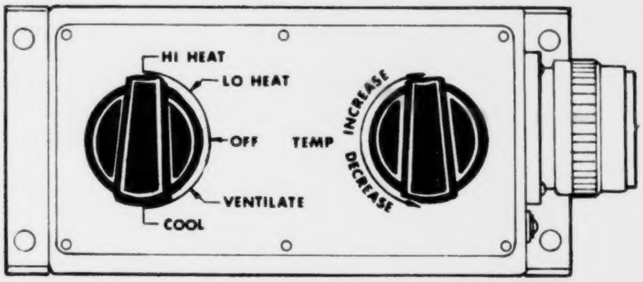

HI HEAT
LO HEAT
OFF
VENTILATE
COOL
TEMP
INCREASE
DECREASE

Figure 2-11. HI HEAT Control Setting

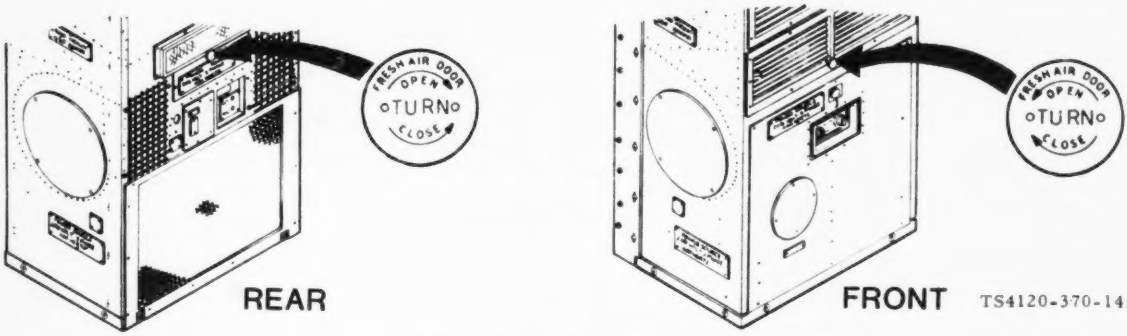
TS4120-370-14/2-11

c. When room or enclosure temperature reaches the desired level, **slowly** turn the TEMPerature control thermostat knob toward DECREASE. Make small adjustments until desired temperature is maintained automatically.

NOTE

Should unit continue to produce too much heat with TEMPerature control thermostat knob adjusted toward the decrease setting, switch to LO HEAT.

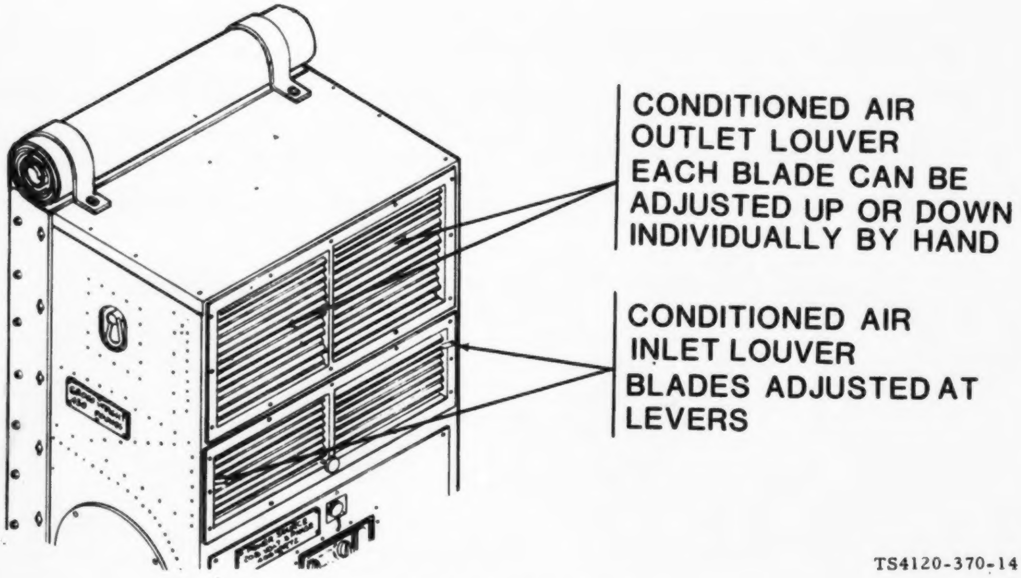
d. Adjust fresh air damper (door) to desired setting. It is normally better to keep the fresh air damper **slightly** open. Damper should be closed during very cold weather and during fast warmup periods.


FRESH AIR DOOR
OPEN
TURN
CLOSE
REAR
FRESH AIR DOOR
OPEN
TURN
CLOSE
FRONT

TS4120-370-14/2-12

Figure 2-12. Fresh Air Damper (Door) Adjustment

e. Adjust louvers to suit. Since warm air tends to rise it is normally better to adjust the conditioned air outlet louvers slightly downward. The conditioned air inlet louvers should be full open.


CONDITIONED AIR
OUTLET LOUVER
EACH BLADE CAN BE
ADJUSTED UP OR DOWN
INDIVIDUALLY BY HAND
CONDITIONED AIR
INLET LOUVER
BLADES ADJUSTED AT
LEVERS

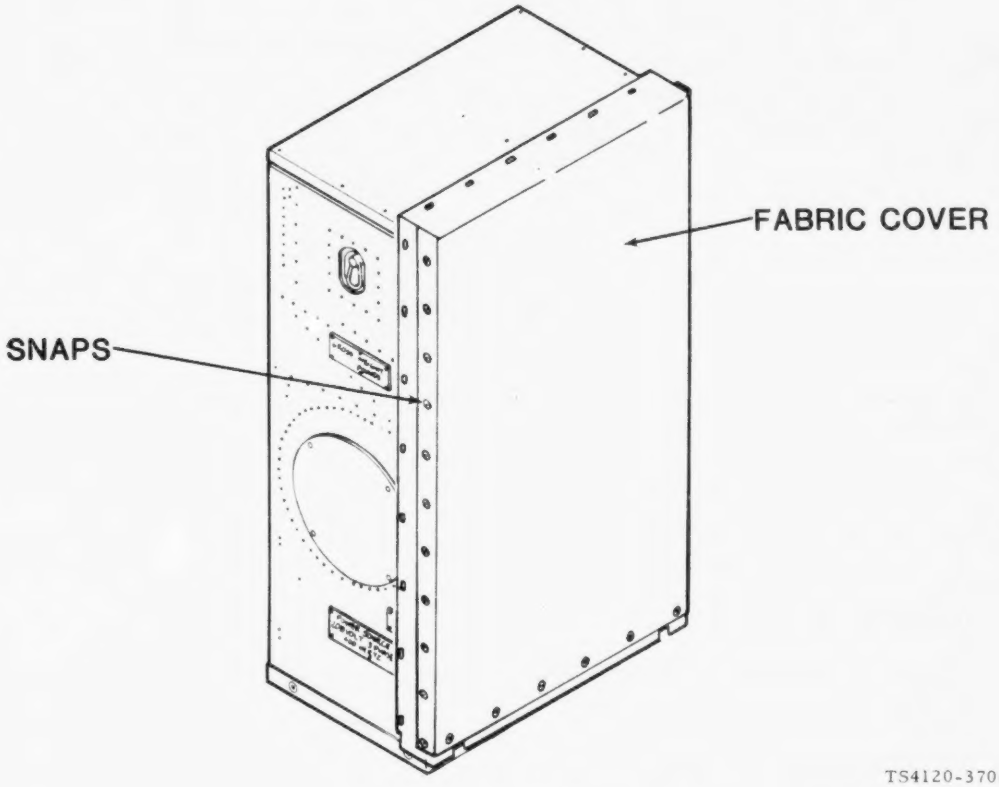
TS4120-370-14/2-13

Figure 2-13. Louver Adjustment

f. During periods of very cold weather the fabric cover should be rolled down and snapped.

NOTE

Fresh (outside) air cannot be introduced with fabric cover rolled down. Close damper.



TS4120-370-14/2-14

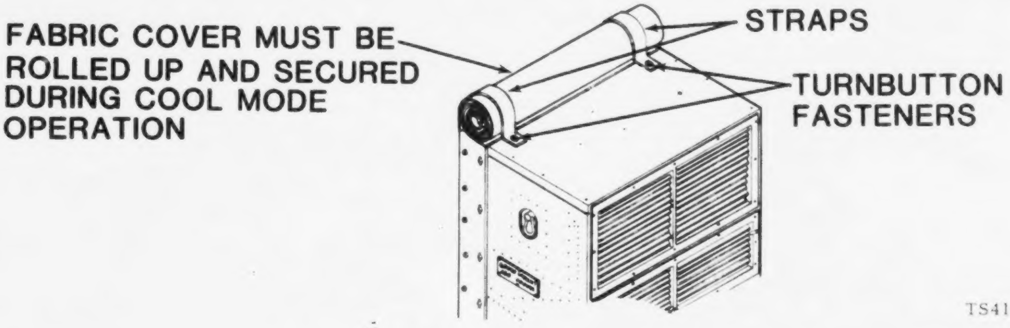
Figure 2-14. Fabric Cover

NOTE

An overheat thermostat located near the heating elements will turn them off if the temperature in the heater compartment reaches an excessive level.

2-11. OPERATION IN COOL MODE

a. Fabric cover **must be** rolled up and secured with turnbutton fasteners.

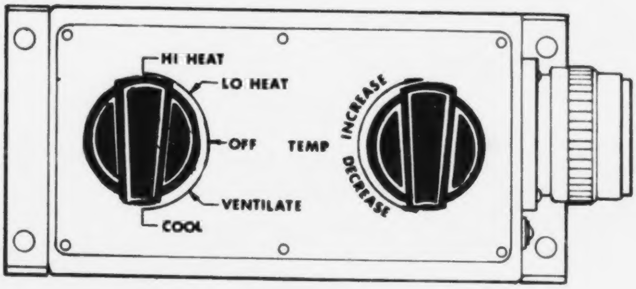

FABRIC COVER MUST BE ROLLED UP AND SECURED DURING COOL MODE OPERATION
STRAPS
TURNBUTTON FASTENERS

TS4120-370-14/2-15

Figure 2-15. Fabric Cover

b. Turn mode selector switch to COOL.

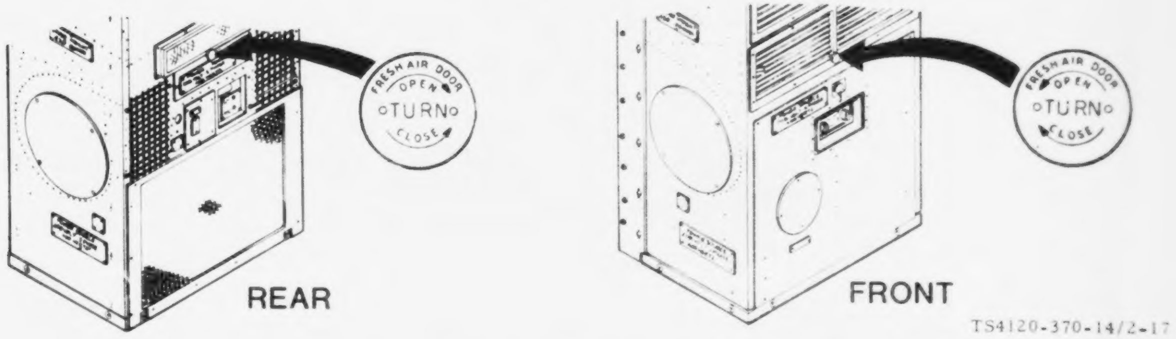
c. Turn TEMPerature control thermostat knob as far as it will go in the DECREASE (cooler) position.


HI HEAT
LO HEAT
OFF
VENTILATE
COOL
TEMP
INCREASE
DECREASE

TS4120-370-14/2-16

Figure 2-16. COOL Control Setting

d. For faster cool down at initial start-up fresh air damper (door) should be closed. After desired cooling temperature is reached, it is normally better to keep the fresh air damper (door) slightly open. During periods of very hot outside temperatures, it should be closed to improve efficiency and conserve energy.

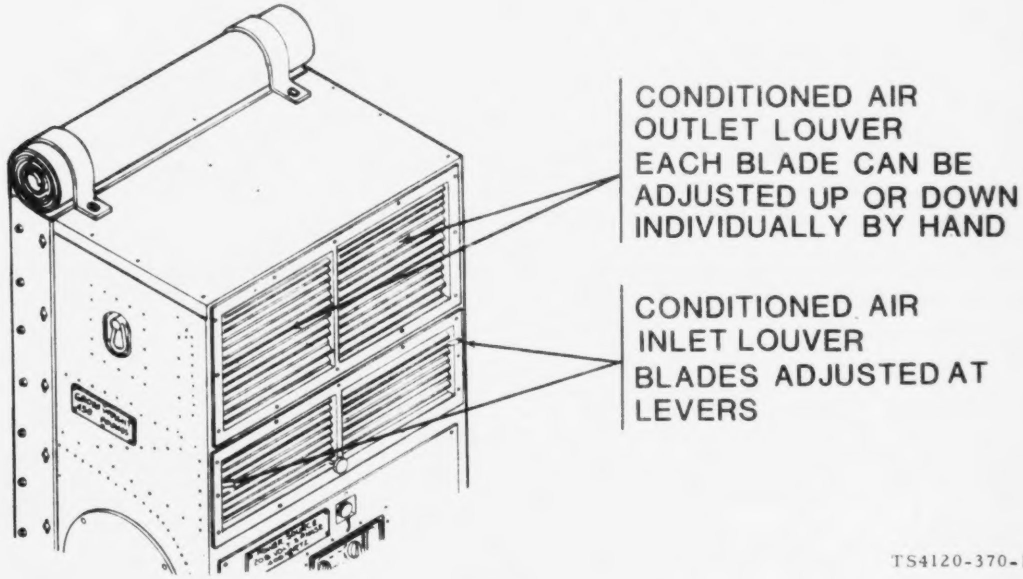

FRESH AIR DOOR
OPEN
TURN
CLOSE
REAR
FRESH AIR DOOR
OPEN
TURN
CLOSE
FRONT

TS4120-370-14/2-17

Figure 2-17. Fresh Air Damper (Door) Adjustment

e. When room or enclosure temperature reaches the desired level, **slowly** turn the TEMPerature control thermostat knob toward INCREASE. Cooling will stop when you reach the approximate room temperature. Further adjustment can be made by turning the TEMPerature control thermostat knob **slightly** toward DECREASE (cooler) or INCREASE (warmer) until desired temperature is controlled automatically.

f. Adjust louvers to suit. Since cold air tends to flow downward, it is normally better to adjust the conditioned air outlet louvers slightly upward. The conditioned air inlet louvers should be full open.

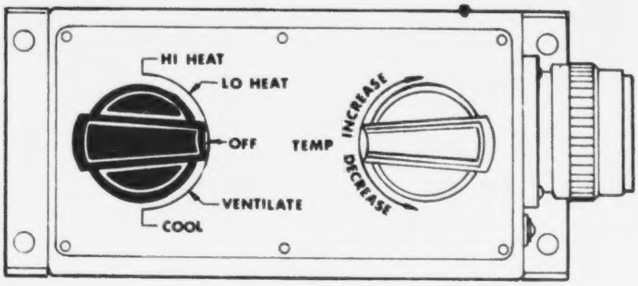

CONDITIONED AIR
OUTLET LOUVER
EACH BLADE CAN BE
ADJUSTED UP OR DOWN
INDIVIDUALLY BY HAND
CONDITIONED AIR
INLET LOUVER
BLADES ADJUSTED AT
LEVERS

TS4120-370-14/2-18

Figure 2-18. Louver Adjustment

2-12. SHUTDOWN (OFF)

a. Turn the mode selector switch to OFF.



TS4120-370-14/2-19

Figure 2-19. OFF Setting

NOTE

DO NOT disconnect or turn off power to the air conditioner during periods of normal shutdown. Power should be disconnected only if unit is to be serviced, during emergency conditions, or during periods of extended shutdown, due to warm up period of compressor heaters.

2-13. PREPARATION FOR MOVEMENT

When the unit is to be moved, the services of organizational maintenance shall be employed for the necessary preparations. See Chapter 4, Section VII.

2-14. INFORMATION PLATES

A number of instruction and identification plates are provided with the unit. See figure 2-20 for external plates.

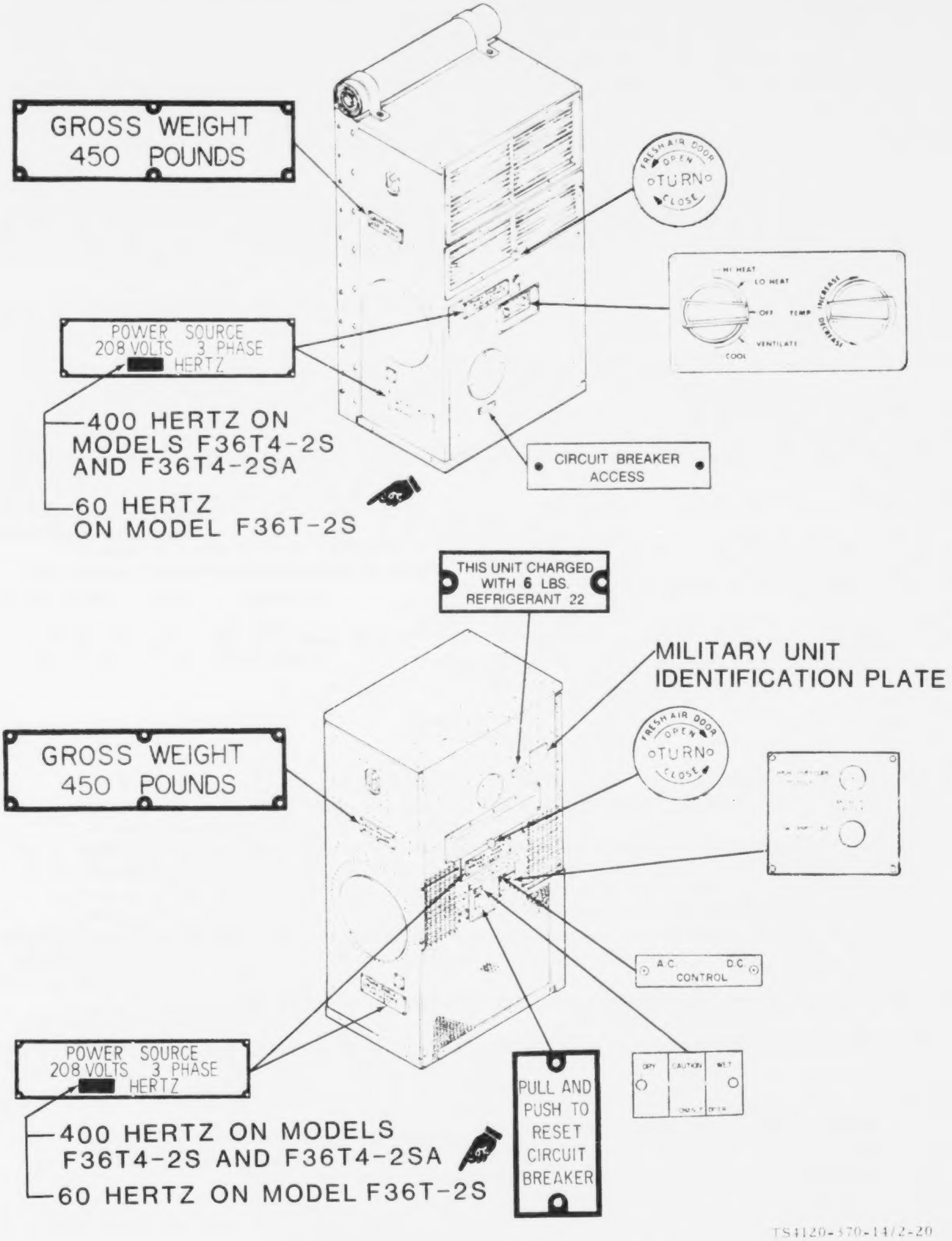

GROSS WEIGHT
450 POUNDS
FRESH AIR DOOR
OPEN
TURN
CLOSE
HI HEAT
LO HEAT
OFF
TEMP
INCREASE
DECREASE
VENTILATE
COOL
POWER SOURCE
208 VOLTS 3 PHASE
HERTZ
400 HERTZ ON MODELS F36T4-2S AND F36T4-2SA
60 HERTZ ON MODEL F36T-2S
CIRCUIT BREAKER ACCESS
THIS UNIT CHARGED WITH 6 LBS. REFRIGERANT 22
MILITARY UNIT IDENTIFICATION PLATE
GROSS WEIGHT
450 POUNDS
FRESH AIR DOOR
OPEN
TURN
CLOSE
A.C.
D.C.
CONTROL
POWER SOURCE
208 VOLTS 3 PHASE
HERTZ
400 HERTZ ON MODELS F36T4-2S AND F36T4-2SA
60 HERTZ ON MODEL F36T-2S
PULL AND PUSH TO RESET CIRCUIT BREAKER
DRY
CAUTION
WET
TS4120-370-14/2-20

Figure 2-20 Information Plates ■

Section IV OPERATION UNDER UNUSUAL CONDITIONS

2-15. GENERAL

The Air Conditioner is designed to operate normally within a wide range of climatic conditions. However, some extreme conditions require special operating and servicing procedures to prevent undue loading and excessive wear on the equipment.

2-16. OPERATION IN EXTREME HEAT

The air conditioner is designed to operate in temperatures up to 125°F (52°C). Extra care should be taken to minimize the cooling load when operating in extremely high temperatures. Some of the steps that may be taken are:

a. Check all openings in the shelter or enclosure, expecially doors and windows, to be sure they are tightly closed. Limit in and out traffic, if possible.

b. When possible, use shades or awnings to shut out direct rays of the sun.

c. Limit the use of electric lights and other heat producing equipment.

d. Limit the amount of hot, outside air introduced through the fresh air damper to that needed for ventilation.

NOTE

Weather stripping, the installation of storm doors and windows (if appropriate), and insulation of surfaces exposed to the outside is recommended when operating in extremely high temperatures for extended periods is anticipated.

2-17. OPERATION IN EXTREME COLD

CAUTION

Do not disturb electrical wiring that has been exposed to extremely low temperatures. Both the wire and insulation become brittle when cold and are easily broken.

The air conditioner is designed to operate in temperatures down to −50°F (−45°C). Extra care should be taken to minimize the heating load when operating in extremely low temperatures. Some of the steps that may be taken are:

a. Check all openings in the enclosure, especially doors and windows, to be sure they are tightly closed. Limit in and out traffic, if possible.

b. Open shades and awnings to permit entry of direct rays of the sun, if appropriate.

c. Limit the amount of cold, outside air introduced through the fresh air damper to that needed for ventilation.

NOTE

Weather stripping, the installation of storm doors and windows (if appropriate), and insulation of surfaces exposed to the outside is recommended when operation at extremely low temperatures for extended periods is anticipated.

2-18. OPERATION IN DUSTY OR SANDY CONDITIONS

Dusty and sandy conditions can seriously reduce the efficiency of the air conditioner by clogging the air filters and thereby causing a restriction of the volume of airflow. Accumulation of dust or sand in the condenser coil and/or in the compressor compartment may cause overheating of the refrigeration system. Dust or sand may also clog the mist eliminator, condensate trap, and water drain lines. Some of the steps that may be taken are:

a. Frequent cleaning of filters and all other areas of dust and sand accumulation. In extreme conditions, daily cleaning of filters may be necessary.

b. Limit the amount of dusty or sandy outside air introduced through the fresh air damper to that essential for ventilation.

c. Roll down and secure the fabric cover on the back of the cabinet during periods of shut-down.

2-19. OPERATION IN UNUSUALLY WET CONDITIONS

The air conditioner is designed for normal exposure to the elements, so it is reasonably waterproof. Some of the steps that should be taken in an extremely wet climate are:

a. More frequent inspection and cleaning of the mist eliminator, condensate trap, and drain lines to insure proper drainage and prevent accumulation of water inside the cabinet.

b. Roll down and secure the fabric cover on the back of the cabinet during periods of wet, windy weather when the air conditioner is not in operation.

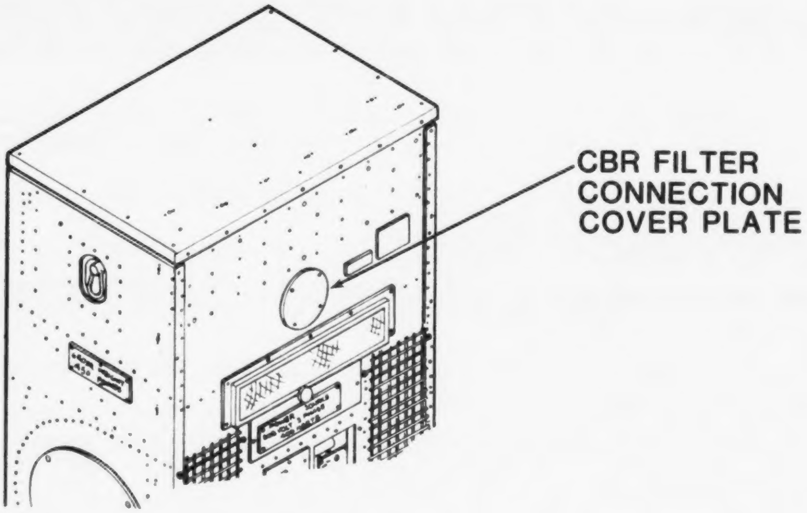
c. Roll up and secure the fabric cover during dry spells when the air conditioner is not in operation so that the interior can dry out and condensation will not accumulate.

2-20. OPERATION IN SALT AIR OR SEA SPRAY

Salt air or sea spray may cause many of the same clogging problems as encountered when operating in a dusty or sandy environment. In addition, the nature of salt presents serious corrosion problems. Frequent cleaning is necessary during which all exposed surfaces should be thoroughly spray rinsed or sponged with fresh water to remove salt. The fabric cover on the back of the cabinet should be rolled down and secured during all periods when the air conditioner is not in operation.

2-21. OPERATION UNDER EMERGENCY CONDITIONS

a. CBR (chemical, biological, radiological) hazard. This unit has provisions for connection to an external CBR filtering source. Should it be necessary to operate in conditions requiring use of CBR filtration equipment, see specific instructions for your shelter or facility installation.



TS4120-370-14/2-21

Figure 2-21. CBR Filter Connection Location

b. The following are general suggestions and do not apply if they conflict with instructions for your shelter or facility installation.

(1) The fresh air damper (door) should be closed, the opening should be covered with a suitable material, and sealed air tight.

(2) Fresh air damper (door) knobs may be removed to prevent damper from being opened.

(3) The conditioned air inlet louvers should be adjusted (partially or completely) closed in conjunction with the CBR filter intake volume. This will cause a more positive pressure on inside of shelter or enclosure and keep air from being drawn in other than through the CBR filter.

c. Power conservation. During periods when full 208 volt, 3 phase power is in critically short supply, if the air conditioner cannot be turned off completely, it should be operated in VENTILATE mode only.

CHAPTER 3

OPERATOR'S MAINTENANCE INSTRUCTIONS

Section I LUBRICATION INSTRUCTIONS

3-1. GENERAL

The Air Conditioner and its major components are designed so that very little lubrication is required during their serviceable lifetime. The refrigerant compressor and its drive motor are hermetically sealed in a single container; sealed bearings are incorporated in the drive motor; and the compressor crankcase contains a lifetime charge of oil. Sealed bearings are incorporated in the evaporator and condenser fan motors.

The only operator lubrication required is that necessary to relieve stiffness or binding of the louver blades in the evaporator intake and discharge grilles or the turn button fasteners associated with the fabric cover on the back of the cabinet. Sparingly apply a light machine oil and work it into the joints or pivots involved. Blot up all excess oil with a cloth or paper towel. Report stiffness or binding of all other operational controls to organizational maintenance for appropriate action.

Section II TROUBLESHOOTING PROCEDURES

3-2. USE OF TABLE

Table 3-1 contains troubleshooting instructions designed to be useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner.

a. The table lists the common malfunctions which you may find during the operation or maintenance of the air conditioner or its components. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

c. Any trouble or corrective action beyond the scope of operator maintenance shall be reported to organizational maintenance.

TABLE 3-1. TROUBLESHOOTING

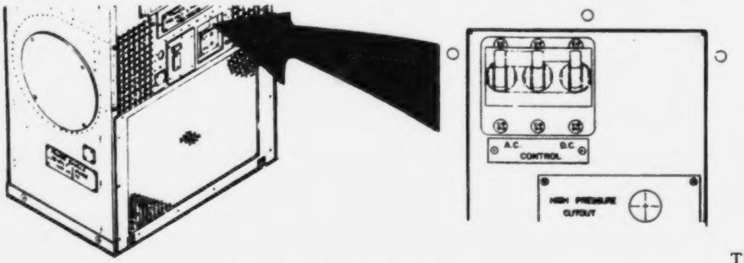
MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

1. AIR CONDITIONER DOES NOT START IN ANY MODE.

Step 1. Check to see if input power has been disconnected.
Connect input power.
Step 2. Check to see if AC or DC CONTROL circuit breakers have tripped.
Reset circuit breaker.



TS4120-370-14/3T1-1

Step 3. Check to see if compressor circuit breaker is tripped.
Slowly PULL out AND PUSH in reset knob TO RESET CIRCUIT BREAKER.

2. AIR CONDITIONER STARTS BUT DOES NOT COOL.

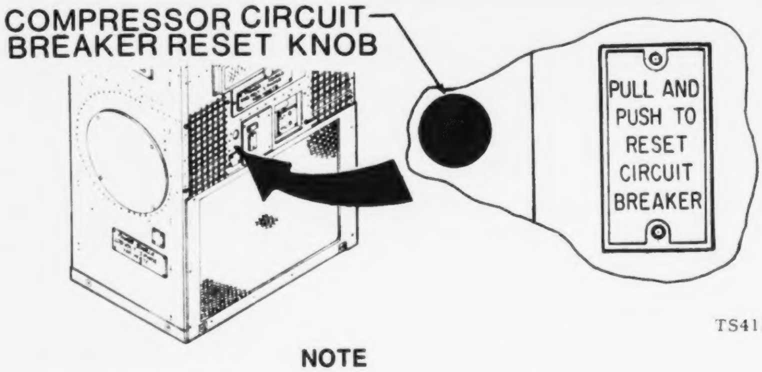
Step 1. Check that mode selector switch is set to COOL and TEMPerature control thermostat is set to DECREASE.
Set mode selector switch to COOL and properly adjust TEMPerature control thermostat.

TABLE 3-1. TROUBLESHOOTING (cont.)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION


COMPRESSOR CIRCUIT BREAKER RESET KNOB
PULL AND PUSH TO RESET CIRCUIT BREAKER

TS4120-370-14/3T1-2

NOTE

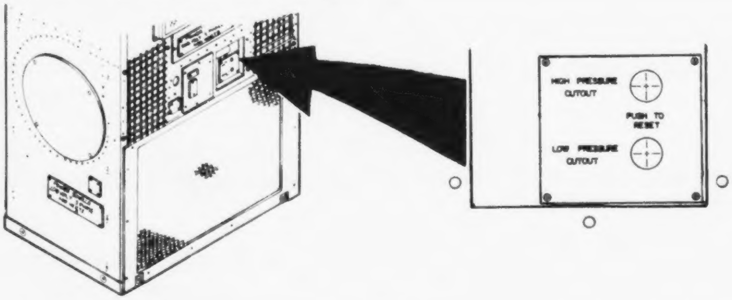
If circuit breakers continue to trip, contact organizational maintenance.

3. COMPRESSOR DOES NOT START IN COOL MODE. (NO COOLING) (Conditioned air fans operate, but condenser air fans do not.)

NOTE

If power has just been connected to unit, a short (30 minute maximum during very cold weather) warm up period is required. When compressor reaches a safe operating temperature, it will come on automatically if the mode selector switch is in the COOL mode.

Step 1. Check to see if HIGH or LOW PRESSURE CUTOUT switch has tripped.
PUSH and release TO RESET.


HIGH PRESSURE CUTOUT
PUSH TO RESET
LOW PRESSURE CUTOUT

TS4120-370-14/3T1-3

NOTE

If cutout switch(es) continue to trip, contact organizational maintenance.

Step 2. Check operation of mode selector switch.
Turn switch to OFF, then reset to COOL.

NOTE

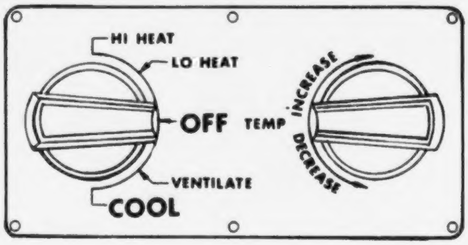
Allow 30 seconds time delay before compressor starts.

TABLE 3-1. TROUBLESHOOTING (cont.)

MALFUNCTION

TEST OR INSPECTION

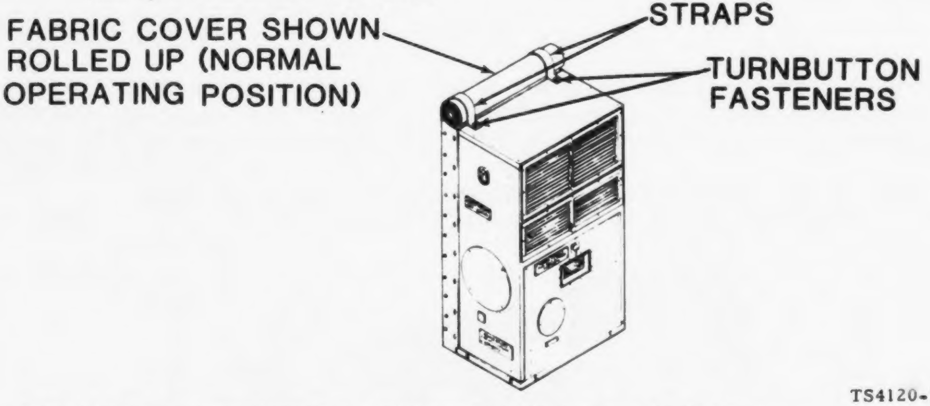
CORRECTIVE ACTION


HI HEAT
LO HEAT
OFF
VENTILATE
COOL
TEMP
INCREASE
DECREASE

TS4120-370-14/3T1-4

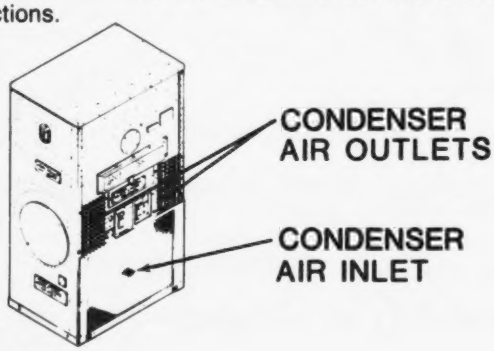
4. COMPRESSOR STARTS NORMALLY, BUT COMPRESSOR CIRCUIT BREAKER SOON TRIPS. (COOLING STOPS)

Step 1. Check to be sure fabric cover is rolled up.
Roll up and secure fabric cover.


FABRIC COVER SHOWN ROLLED UP (NORMAL OPERATING POSITION)
STRAPS
TURNBUTTON FASTENERS

TS4120-370-14/3T1-5

Step 2. Check to be sure condenser air inlet and outlets are not obstructed.
Remove obstructions.


CONDENSER AIR OUTLETS
CONDENSER AIR INLET

TS4120-370-14/3T 1-6

TABLE 3-1. TROUBLESHOOTING (cont.)

MALFUNCTION

TEST OR INSPECTION

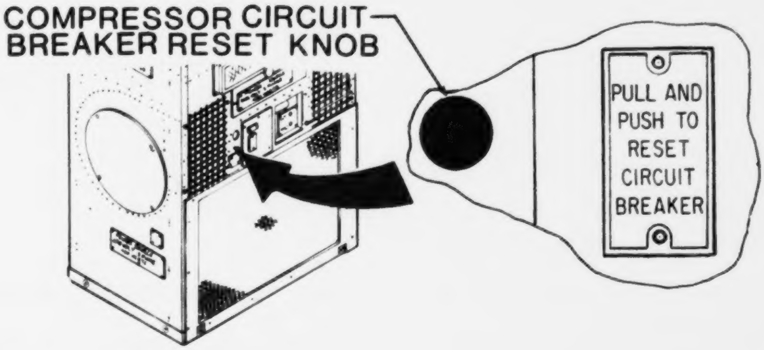
CORRECTIVE ACTION

Step 3. Check to be sure that condenser fans are operating. (Air being discharged from condenser air outlets.)

Reset compressor circuit breaker and restart in COOL mode.

CAUTION

If condenser fans do not operate immediately, turn selector switch to OFF and contact organizational maintenance.

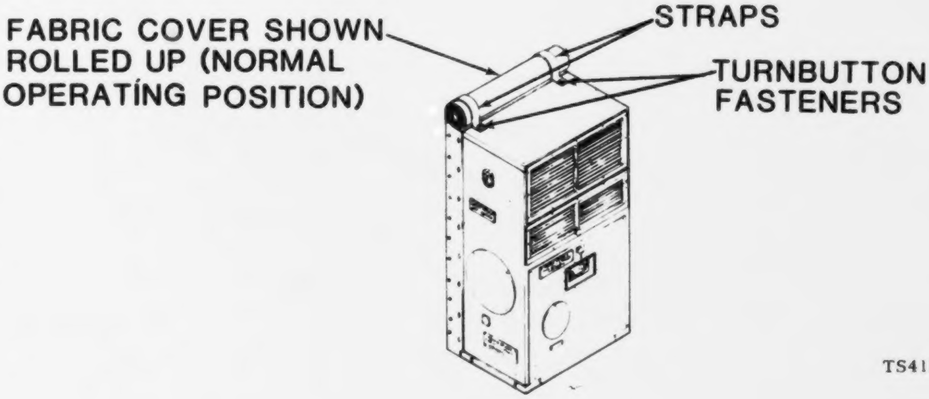

COMPRESSOR CIRCUIT BREAKER RESET KNOB
PULL AND PUSH TO RESET CIRCUIT BREAKER

TS4120-370-14/3T1-7

5. COMPRESSOR STARTS NORMALLY, BUT HIGH OR LOW PRESSURE CUTOUT SWITCH SOON TRIPS. (COOLING STOPS)

Step 1. Check to be sure fabric cover is rolled up.

Roll up and secure fabric cover.


FABRIC COVER SHOWN ROLLED UP (NORMAL OPERATING POSITION)
STRAPS
TURNBUTTON FASTENERS

TS4120-370-14/3T1-8

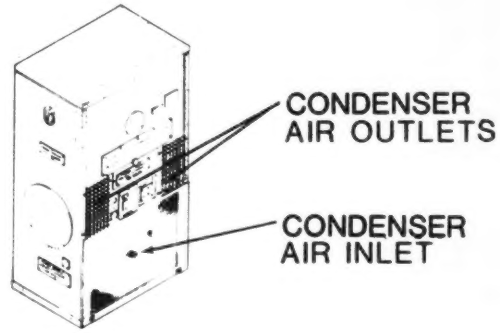
TABLE 3-1. TROUBLESHOOTING (cont.)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 2. Check to be sure condenser air inlet and outlets are not obstructed.
Remove obstructions.

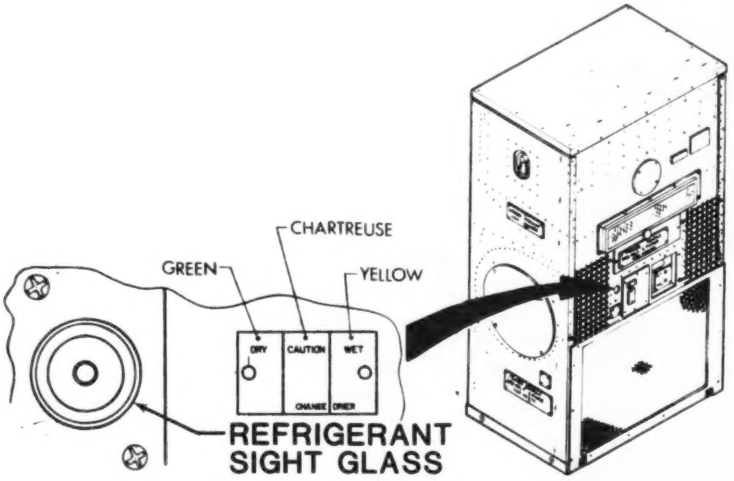

CONDENSER AIR OUTLETS
CONDENSER AIR INLET

TS4120-370-14/3T1-9

Step 3. Reset (PUSH) PRESSURE CUTOUT switch(es) and restart unit.
If unit does not start contact organizational maintenance.

Step 4. Check to be sure that condenser fans are operating. (Air being discharged from condenser air outlets.)
If fans are not operating, shut unit off and contact organizational maintenance.

Step 5. With unit operating in COOL mode, check condition of refrigerant in sight glass. Check after 15 minutes of operation in full DECREASE and COOL mode.
If indicator color is in the yellow zone or numerous bubbles appear in the window, turn selector switch to OFF and contact organizational maintenance.


CHARTREUSE
GREEN
YELLOW
DRY
CAUTION
WET
CHANGE DRIER
REFRIGERANT SIGHT GLASS

TS4120-370-14/3T1-10

TABLE 3-1. TROUBLESHOOTING (cont.)

MALFUNCTION

TEST OR INSPECTION

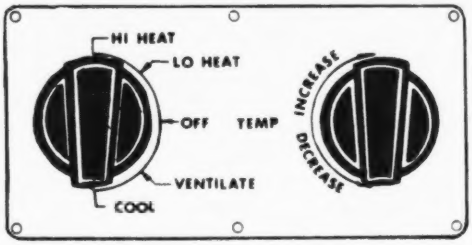
CORRECTIVE ACTION

Step 6. Check that lower front panel is not loose or missing.
Lower front panel must be secure.

6. REDUCED COOLING CAPACITY. (SEE MALFUNCTIONS 3, 4, and 5.)

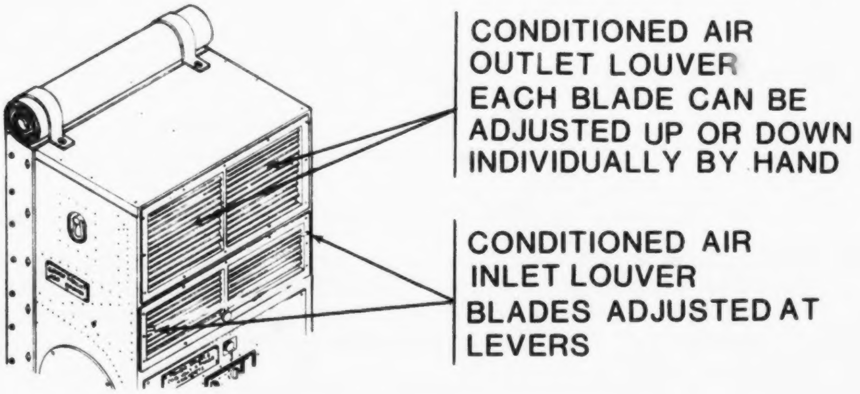
Step 1. Check that all doors, windows, and other openings in the room or enclosure are tightly closed.
Tightly close all openings.

Step 2. Check operation of TEMPerature control thermostat.
Set control at maximum DECREASE; then, if condition improves, adjust properly.


HI HEAT
LO HEAT
OFF
VENTILATE
COOL
TEMP
INCREASE
DECREASE

TS4120-370-14/3T1-11

Step 3. Check that the louvers in the conditioned air inlet and outlet grilles are properly adjusted. (Must be open.)
Adjust louvers properly.


CONDITIONED AIR OUTLET LOUVER
EACH BLADE CAN BE ADJUSTED UP OR DOWN INDIVIDUALLY BY HAND
CONDITIONED AIR INLET LOUVER
BLADES ADJUSTED AT LEVERS

TS4120-370-14/3T1-12

TABLE 3-1. TROUBLESHOOTING (cont.)

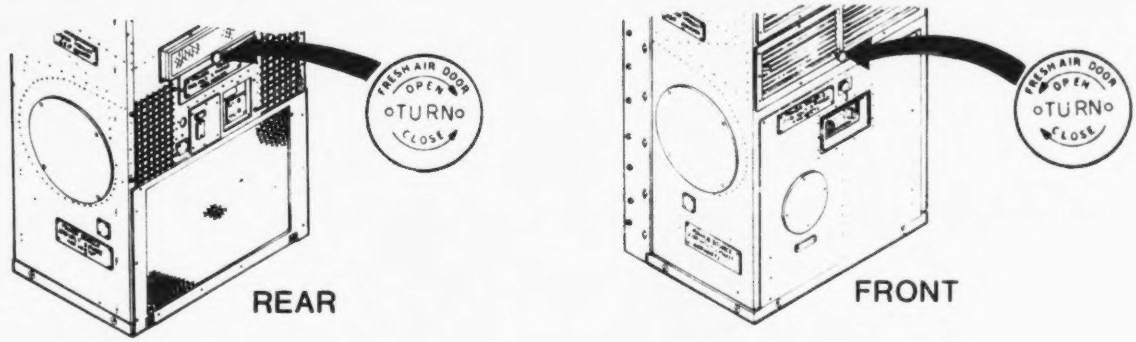
MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 4. Check to be sure that excessive hot, outside air is not being introduced through the fresh air damper.

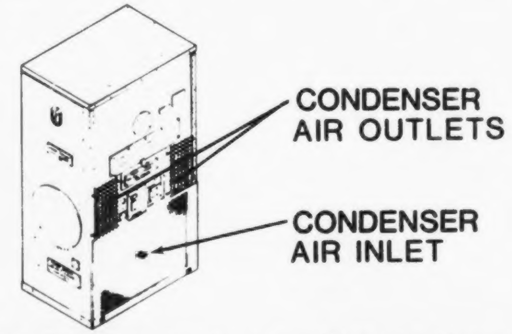
Fully close damper; then, if condition improves, adjust properly.


FRESH AIR DOOR
OPEN
TURN
CLOSE
REAR
FRESH AIR DOOR
OPEN
TURN
CLOSE
FRONT

TS4120-370-14/3T1-13

Step 5. Check to be sure condenser air inlet and outlets are not obstructed.

Remove obstructions.


CONDENSER
AIR OUTLETS
CONDENSER
AIR INLET

TS4120-370-14/3T1-14

Step 6. With unit operating in COOL mode, check condition of refrigerant in sight glass. Check after 15 minutes of operation in full DECREASE and COOL mode.

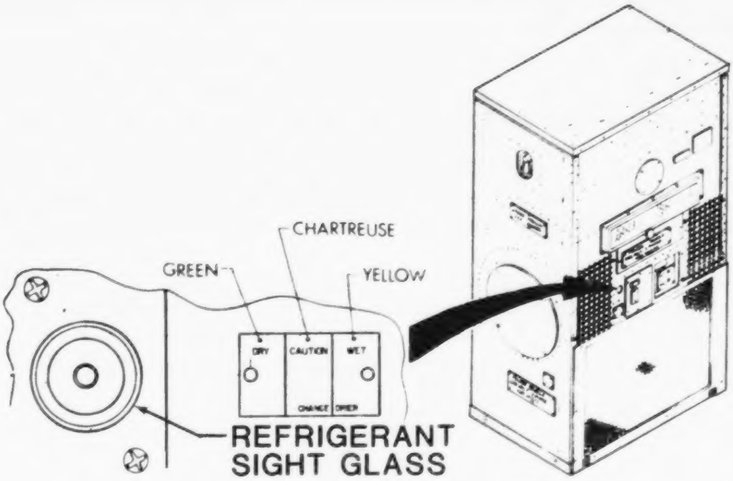
If indicator color is in the yellow zone or numerous bubbles appear in window, turn selector to OFF and contact organizational maintenance.

TABLE 3-1. TROUBLESHOOTING (cont.)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION


CHARTREUSE
GREEN
YELLOW
DRY
CAUTION
WET
CHANGE
DRIER
REFRIGERANT SIGHT GLASS

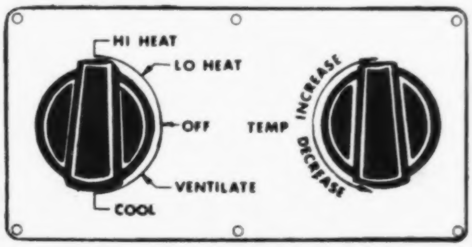
TS4120-370-14/3T1-15

7. REDUCED HEATING CAPACITY.

Step 1. Check that all doors, windows, and other openings in the room or enclosure are tightly closed.
Tightly close all openings.

Step 2. If control panel is remotely located, check to be sure that the sensing bulb is not near a light bulb or some type of heat producing equipment.
Turn off or move heat source.

Step 3. Check operation of TEMPerature control thermostat.
Set control to fully INCREASE; then, if condition improves, adjust properly.


HI HEAT
LO HEAT
OFF
VENTILATE
COOL
TEMP
INCREASE
DECREASE

TS4120-370-14/3T1-16

TABLE 3-1. TROUBLESHOOTING (cont.)

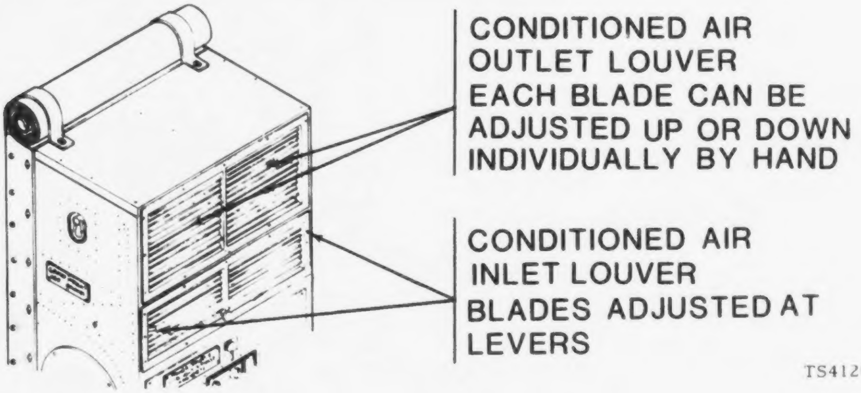
MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 4. Check that the louvers in the conditioned air inlet outlet grilles are properly adjusted.

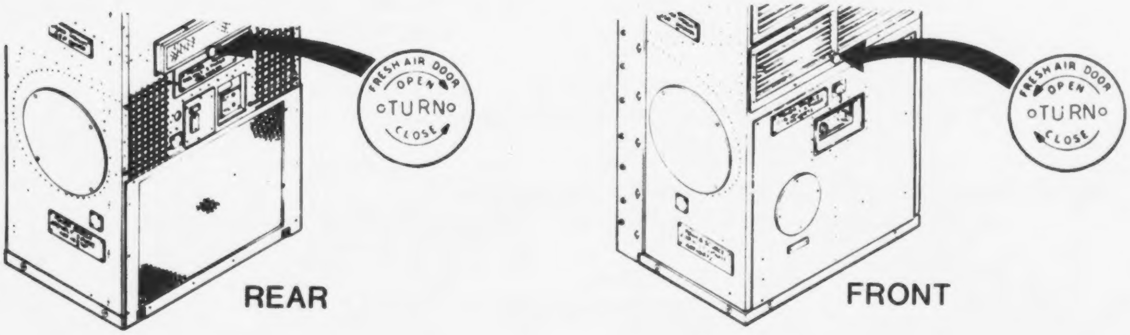
Adjust louvers properly.


CONDITIONED AIR OUTLET LOUVER
EACH BLADE CAN BE ADJUSTED UP OR DOWN INDIVIDUALLY BY HAND
CONDITIONED AIR INLET LOUVER
BLADES ADJUSTED AT LEVERS

TS4120-370-14/3T1-17

Step 5. Check to be sure that excessive cold, outside air is not being introduced through the fresh air damper.

Fully close damper; then, if condition improves, adjust properly.


FRESH AIR DOOR
OPEN
TURN
CLOSE
REAR
FRESH AIR DOOR
OPEN
TURN
CLOSE
FRONT

TS4120-370-14/3T1-18

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

4-1. GENERAL

a. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

b. No special tools are required for maintenance of the equipment. Test, Maintenance, and Diagnostic Equipment (TMDE) and Support Equipment include standard equipment found in any organizational maintenance shop.

c. Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM 5-4120-370-24P/ T.O. 35E9-229-4, covering organizational direct support and general support maintenance for this equipment.

Section II SERVICE UPON RECEIPT

4-2. UNLOADING

The Air Conditioner is packaged in a container designed for shipment and handling with the cabinet in an upright position. The base of the container is constructed as a shipping pallet with provisions for the insertion of the tongs of a fork on materials handling equipment.

a. Remove all blocking and tie downs that may have been used to secure the container to the carrier.

b. Use a forklift truck or other suitable material handling equipment to remove the unit from the carrier.

CAUTION

Use care in handling to avoid damage to the air conditioner. If an overhead lifting device must be used, use an appropriate sling so that the weight of the unit is supported by the base of the shipping container.

WARNING

Do not allow the unit to swing while suspended from a lifting device. Failure to observe this warning may result in injury to personnel and damage to the equipment.

4-3. UNPACKING

a. General. Normally, the packaged air conditioner should be moved into the immediate area in which it is to be installed before it is unpacked.

NOTE

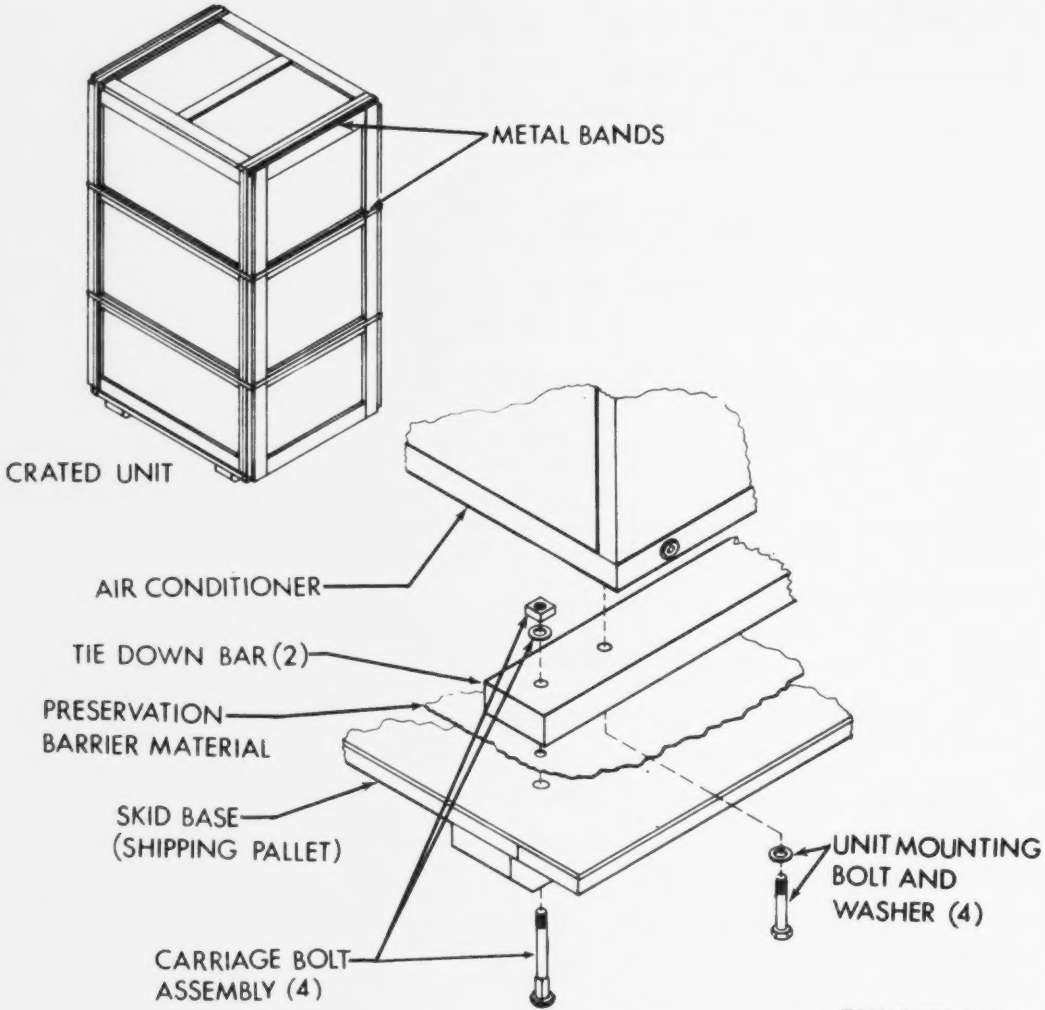
The shipping container is of such a design that it may be retained for reuse for mobility purposes if frequent relocation of the air conditioner is anticipated.

b. Remove shipping container. Cut the metal bands that hold the top and sides of the container to the base. Lift the container vertically and remove it from the base and cabinet.

c. Remove packaging. Remove the cushioning around the top of the cabinet and retain, if reuse is anticipated. Remove the preservation barrier by tearing around the bottom of the cabinet. Remove the technical publications envelope and accessory sack that are taped to the cabinet and put them in a safe place.

NOTE

It is recommended that the cabinet be left bolted to the shipping pallet until time to place it in the installation position. All receiving inspection actions can be conducted without removal from the pallet.


METAL BANDS
CRATED UNIT
AIR CONDITIONER
TIE DOWN BAR (2)
PRESERVATION BARRIER MATERIAL
SKID BASE (SHIPPING PALLET)
UNIT MOUNTING BOLT AND WASHER (4)
CARRIAGE BOLT ASSEMBLY (4)

TS4120-370-14/4-1

Figure 4-1. Unpacking

d. Remove pallet. Attach an overhead hoist with an appropriate sling and spreader bar to the lifting fittings provided at each side of the cabinet. Raise the cabinet and remove the four carriage bolt assemblies that hold the tiedown bars to the pallet from the underside of the pallet. Remove the four bolts that hold the two tiedown bars to the unit base. Remove and retain the pallet and carriage bolt assemblies and the tiedown bars and bolts, if reuse is anticipated. Be sure to remove all remaining barrier material from the underside of the cabinet base. Lower the cabinet to the floor in the desired position and remove the sling and hoist.

NOTE

The bolts used to anchor the cabinet base to the tiedown bars may be used to anchor it in place in the installed location if the installation method allows for anchoring from beneath.

4-4. RECEIVING INSPECTION

Perform receiving inspection of the air conditioner in the following manner:

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report damage on SF 364 Report of Discrepency (ROD).

b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DAPAM 738-750.

c. Check to see whether the equipment has been modified.

4-5. INSTALLATION SITE PREPARATION

a. General. The air conditioner is designed so that it is adaptable to a variety of installation arrangements. Most typical installations are made by preparing an opening in an exterior wall of the room or enclosure to be conditioned and positioning the air conditioner so that the front of the cabinet is inside the room or enclosure and the back outside. Alternate installations may be made with the entire cabinet either inside or outside the conditioned area. The following are minimum requirements for all installations:

(1) A relatively level surface, capable of bearing the weight of the air conditioner, on which to set the base. To insure proper condensate drainage, the surface should be level within 5° from front to back and side to side. See figure 4-2, sheets 1 and 2, for installation dimensions.

(2) An unobstructed flow of air from outside the conditioned area to the inlet and the two outlets of the condenser fans.

(3) An obstructed flow of air from inside the conditioned area to the conditioned air intake and discharge.

(4) An unobstructed flow of air from outside the conditioned area to the fresh air damper intake and/or CBR filter intake, if installed.

(5) Access to the front and back of the cabinet for routine operation and servicing and for necessary maintenance actions.

(6) Access to the top of the cabinet for removal of the top panel and sufficient headroom to allow maintenance actions and internal component removal and installation through the top panel opening if possible.

(7) A source of 208 volt, 3 phase, 400 hertz for models F36T4-2S and F36T4-2SA or 50/60 hertz for model F36T-2S input power rated at 48 amps. The power source outlet should be located as near as possible to the installed location of the air conditioner. The power source wiring must include a disconnect switch. However, provisions should be made to insure that power is not disconnected during normal operation and that the disconnect is not used to turn off the air conditioner for normal shut-down.

(8) An earth ground capable of handling 48 amps.

(9) Check that no source of dangerous or objectionable fumes are located near the fresh air intake.

(10) If possible make use of terrain features such as trees and buildings to provide a shaded location. This will minimize the cooling load on the air conditioner.

(11) If possible avoid locations where the condenser and fresh air intakes will be laden with dust, dirt, soot, smoke, or other debris.

b. Through the wall installation. Prepare an opening in the wall large enough to slide the air conditioner through. (See fig. 4-2, sheets 1 and 2.) Consideration should be given to service of internal components. All openings around air conditioner must be sealed air tight.

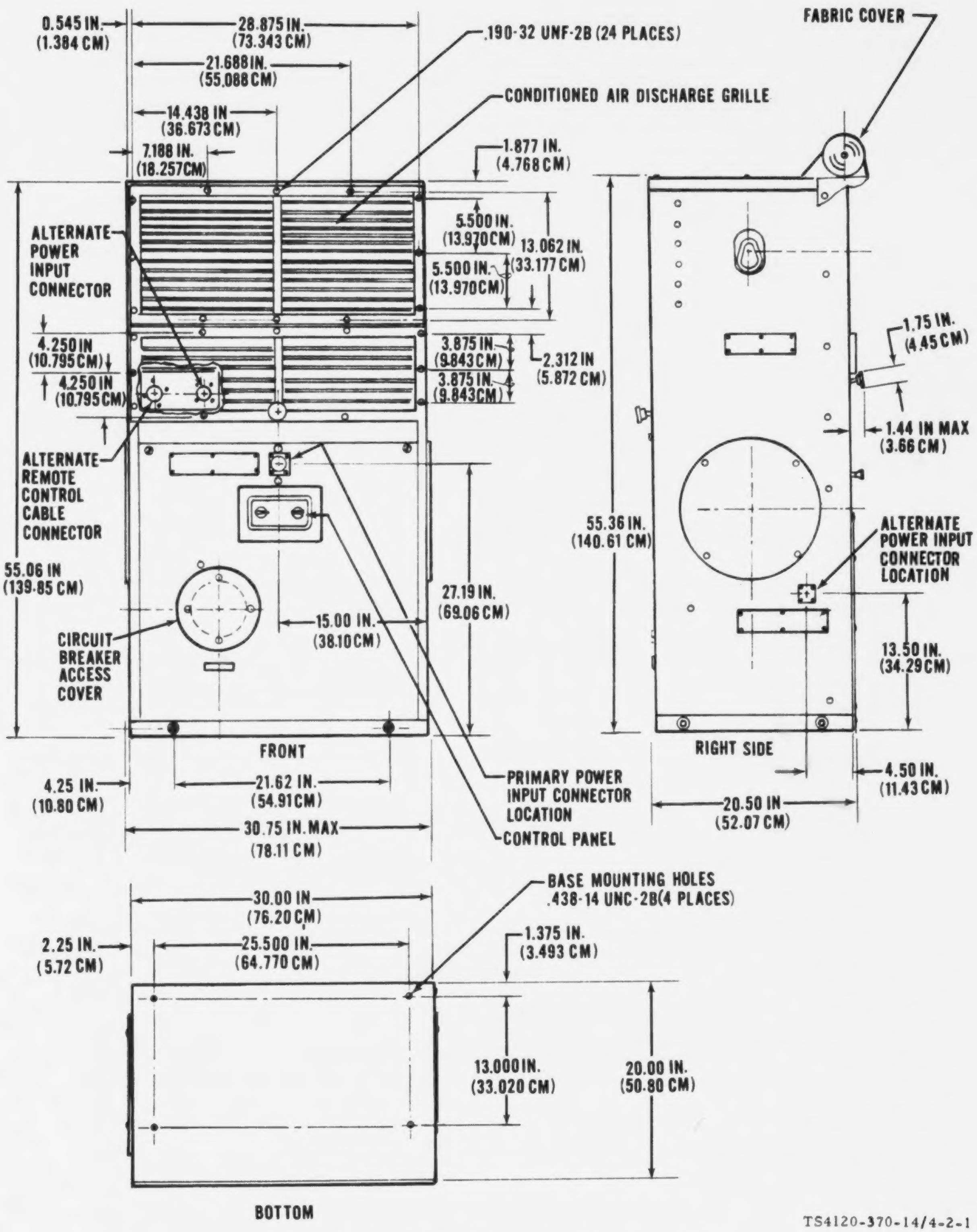

0.545 IN.
(1.384 CM)
28.875 IN.
(73.343 CM)
21.688 IN.
(55.088 CM)
14.438 IN
(36.673 CM)
7.188 IN.
(18.257CM)
.190-32 UNF-2B (24 PLACES)
CONDITIONED AIR DISCHARGE GRILLE
FABRIC COVER
1.877 IN.
(4.768 CM)
5.500 IN.
(13.970 CM)
13.062 IN.
(33.177 CM)
5.500 IN.
(13.970 CM)
ALTERNATE POWER INPUT CONNECTOR
4.250 IN
(10.795 CM)
4.250 IN
(10.795 CM)
3.875 IN.
(9.843 CM)
3.875 IN.
(9.843 CM)
2.312 IN
(5.872 CM)
1.75 IN.
(4.45 CM)
1.44 IN MAX
(3.66 CM)
ALTERNATE REMOTE CONTROL CABLE CONNECTOR
55.06 IN
(139.85 CM)
CIRCUIT BREAKER ACCESS COVER
15.00 IN.
(38.10 CM)
27.19 IN.
(69.06 CM)
55.36 IN.
(140.61 CM)
ALTERNATE POWER INPUT CONNECTOR LOCATION
13.50 IN.
(34.29 CM)
FRONT
RIGHT SIDE
4.25 IN.
(10.80 CM)
21.62 IN.
(54.91 CM)
30.75 IN. MAX
(78.11 CM)
PRIMARY POWER INPUT CONNECTOR LOCATION
CONTROL PANEL
20.50 IN
(52.07 CM)
4.50 IN.
(11.43 CM)
BASE MOUNTING HOLES .438-14 UNC-2B(4 PLACES)
30.00 IN
(76.20 CM)
2.25 IN.
(5.72 CM)
25.500 IN.
(64.770 CM)
1.375 IN.
(3.493 CM)
13.000 IN.
(33.020 CM)
20.00 IN.
(50.80 CM)
BOTTOM
TS4120-370-14/4-2-1

Figure 4-2. Installation Dimensions (Sheet 1 of 2)

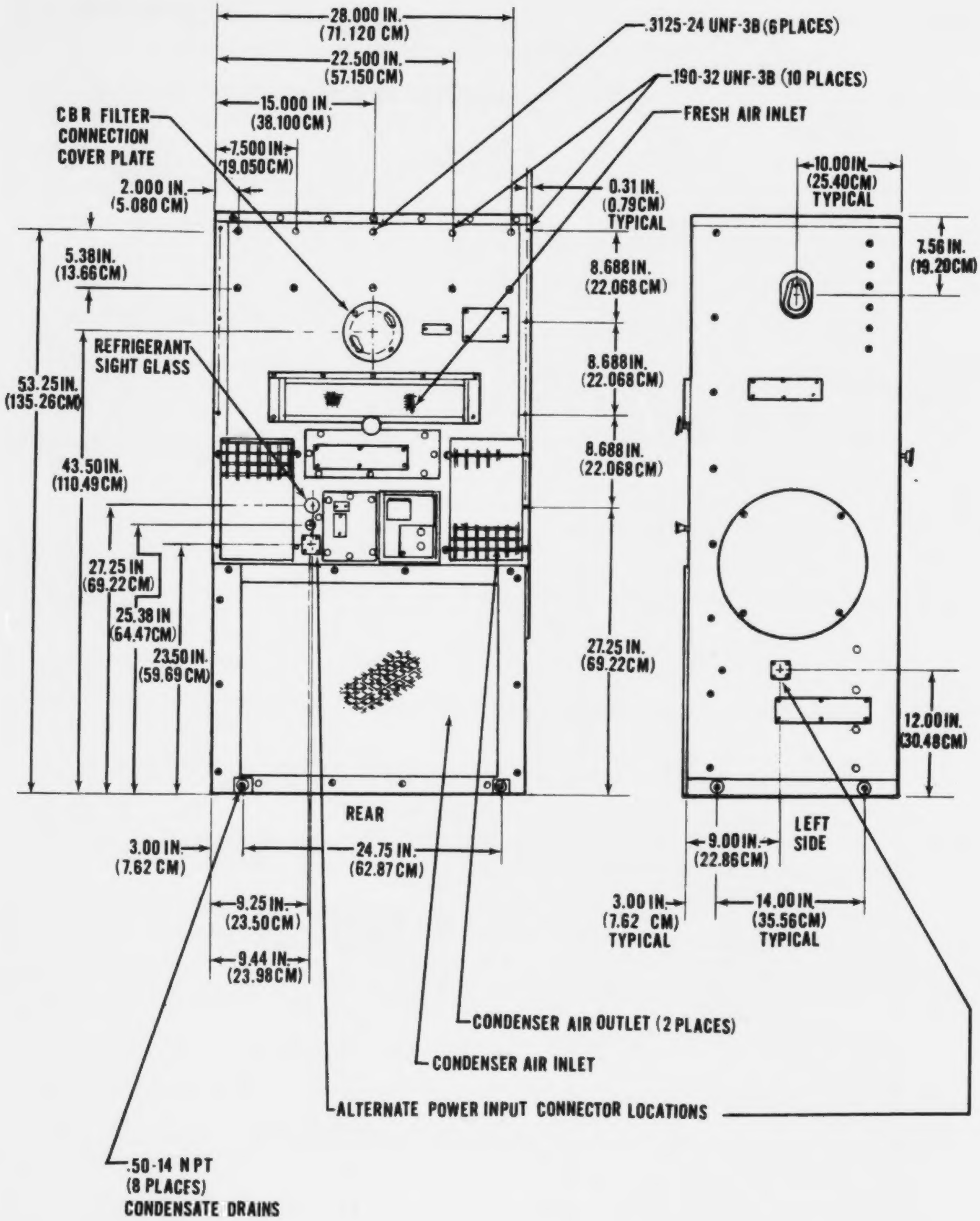

28.000 IN.
(71.120 CM)
22.500 IN.
(57.150 CM)
15.000 IN.
(38.100 CM)
7.500 IN.
(19.050 CM)
2.000 IN.
(5.080 CM)
.3125-24 UNF-3B (6 PLACES)
.190-32 UNF-3B (10 PLACES)
FRESH AIR INLET
CBR FILTER CONNECTION COVER PLATE
0.31 IN.
(0.79 CM)
TYPICAL
10.00 IN.
(25.40 CM)
TYPICAL
7.56 IN.
(19.20 CM)
5.38 IN.
(13.66 CM)
8.688 IN.
(22.068 CM)
8.688 IN.
(22.068 CM)
8.688 IN.
(22.068 CM)
REFRIGERANT SIGHT GLASS
53.25 IN.
(135.26 CM)
43.50 IN.
(110.49 CM)
27.25 IN
(69.22 CM)
25.38 IN
(64.47 CM)
23.50 IN.
(59.69 CM)
27.25 IN.
(69.22 CM)
12.00 IN.
(30.48 CM)
REAR
LEFT SIDE
3.00 IN.
(7.62 CM)
24.75 IN.
(62.87 CM)
9.25 IN.
(23.50 CM)
9.44 IN.
(23.98 CM)
9.00 IN.
(22.86 CM)
3.00 IN.
(7.62 CM)
TYPICAL
14.00 IN.
(35.56 CM)
TYPICAL
CONDENSER AIR OUTLET (2 PLACES)
CONDENSER AIR INLET
ALTERNATE POWER INPUT CONNECTOR LOCATIONS
.50-14 NPT
(8 PLACES)
CONDENSATE DRAINS

Figure 4-2. Installation Dimensions (Sheet 2 of 2)

TS4120-370-14/4-2-2

c. Inside installation. Manufacture an arrangement of ducts for the condenser intake and discharge air openings, and the fresh air damper intake and/or CBR filter intake, if installed. Ducts may be made for attachment to the air conditioner cabinet using the mounting holes for the condenser inlet and outlet guards and grilles, and the fresh air filter frame and/or the air intake on the CBR filter or some other arrangement may be made. Prepare appropriate openings in an exterior wall for the ducts. Ducts may be designed to use the condenser inlet and outlet guards and grilles and the fresh air filter and frame supplied with the air conditioner and relocated and installed on the new duct work. Adequate replacements or some other arrangement of these items may be provided.

CAUTION

Easy access to air filters must be provided. Filters may be left in unit or relocated in duct work. Some installations (filters relocated in duct work) may require different size filters.

d. Outside installation. Manufacture an arrangement of ducts for the conditioned air intake and discharge air. Ducts may be made for attachment to the air conditioner cabinet using the mounting holes for the conditioned air intake and discharge grilles or some other arrangement may be made. Ducts may also be made for installation of the conditioned air intake and discharge grilles on the inside ends or replacements for these items may be used. Prepare appropriate openings in the appropriate wall for the ducts.

NOTE

Retain all items removed from air conditioner. Store them in a safe place. These parts must be reinstalled prior to returning air conditioner to supply. For a list of required items, see Appendix C.

4-6. AIR CONDITIONER PREPARATION FOR INSTALLATION

a. General. No preparation is necessary if the air conditioner is to be installed by the typical exterior wall opening method and operated as a self-contained unit. For alternate installation methods, some preparation is necessary.

b. The unit is designed to provide for several basic types of installation. See the following paragraphs for instructions only if they are applicable to your requirements.

(1) Remote mounting of control panel. (See para 4-7.)

(2) When power and/or control cable(s) are to be connected through the return air duct, see paragraph 4-8.

(3) Alternate input power cable connector locations. (See para 4-9.)

(4) Installations that require removal of the fabric cover. (See para 4-10.)

4-7. REMOTE MOUNTING OF CONTROL PANEL

This paragraph is applicable only when the control panel is to be remote mounted. If the control panel is to be removed from the unit and installed in a remote location, follow instructions of this paragraph.

WARNING

Be sure input power is disconnected before doing any work inside the air conditioner cabinet. Voltages used can kill.

a. Using allen wrench, loosen setscrew and remove front fresh air damper control knob.

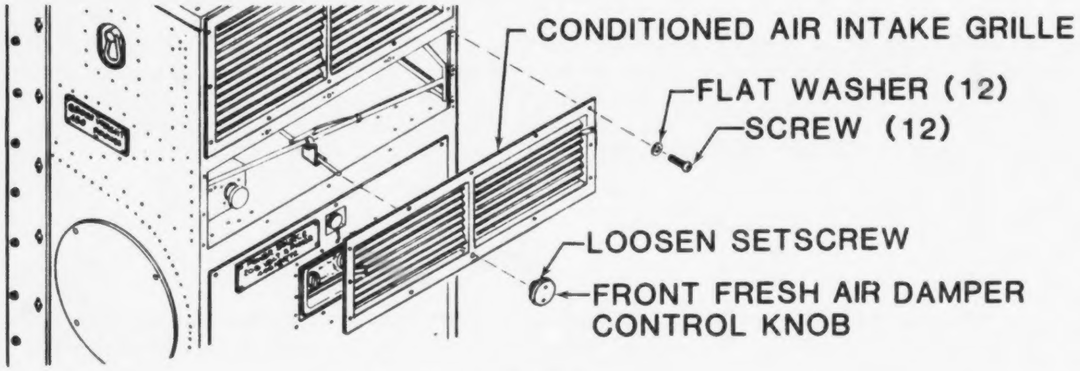
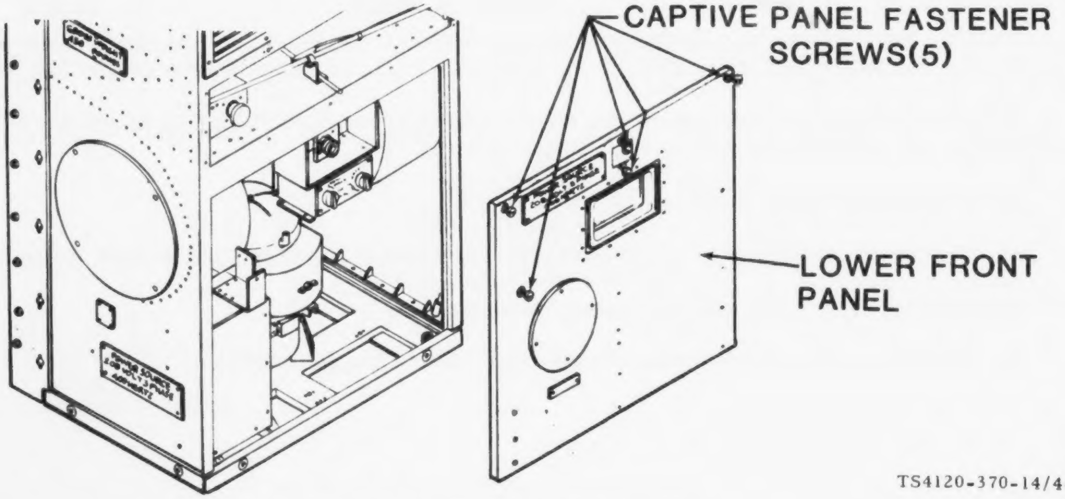

CONDITIONED AIR INTAKE GRILLE
FLAT WASHER (12)
SCREW (12)
LOOSEN SETSCREW
FRONT FRESH AIR DAMPER CONTROL KNOB

Figure 4-3. Grille Removal

TS4120-370-14/4-3

b. Using screwdriver, remove twelve screws and flat washers. Remove conditioned air intake grille. Be careful not to damage grille gaskets.

c. Check that electrical connector cover has been unscrewed from connector.


CAPTIVE PANEL FASTENER SCREWS(5)
LOWER FRONT PANEL

TS4120-370-14/4-4

Figure 4-4. Lower Front Panel Removal

d. Using screwdriver, loosen five captive panel fastener screws.

e. Tip top of lower front panel away from unit and lift panel up to clear flange on bottom of panel.

f. Using screwdriver and wrench, loosen screw and nut in the two loop clamps that hold the sensing bulb and drain line.

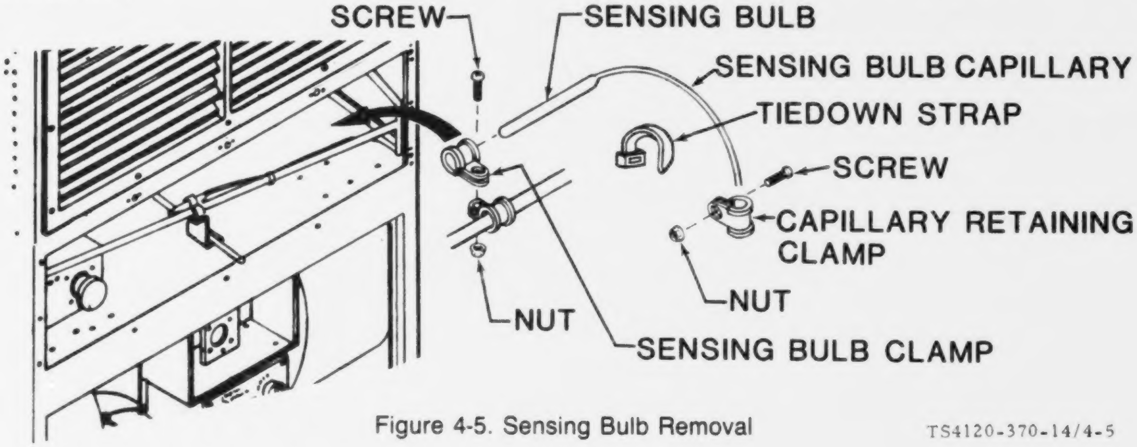

SCREW
SENSING BULB
SENSING BULB CAPILLARY
TIEDOWN STRAP
SCREW
CAPILLARY RETAINING CLAMP
NUT
NUT
SENSING BULB CLAMP

Figure 4-5. Sensing Bulb Removal

TS4120-370-14/4-5

CAUTION

Take care that sensing bulb capillary line is not kinked and that bulb and capillary are not cut or damaged during removal.

g. Using screwdriver and wrench, remove screw, nut, and clamp that retain sensing bulb capillary to side casing.

h. Using knife, carefully cut and remove plastic tie down strap.

i. Slip sensing bulb out of clamp and carefully guide capillary line and sensing bulb down into lower compartment.

j. Using screwdriver and wrench, reinstall capillary retaining clamp (for possible future use) and tighten bulb and drain line clamp hardware.

k. Disconnect wiring harness connector P8 from connector J8 on the control panel.

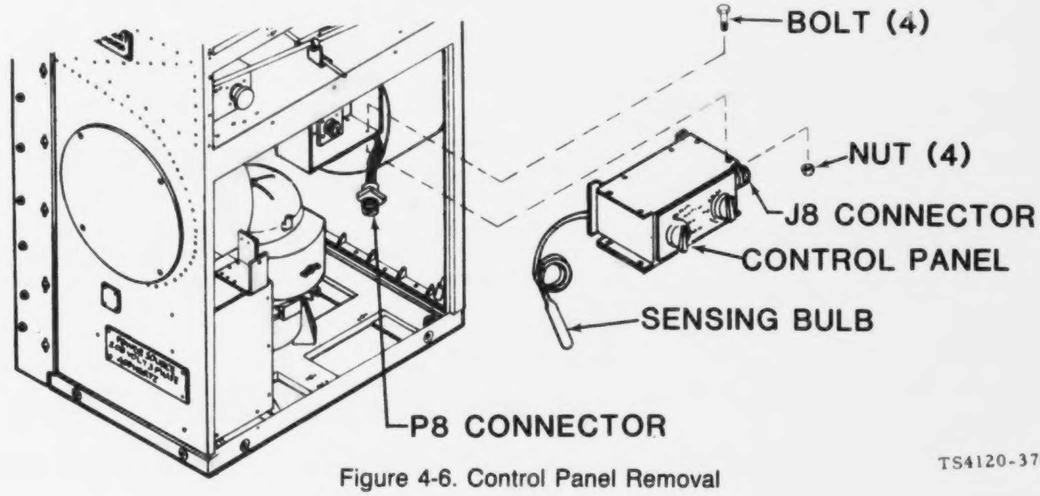

BOLT (4)
NUT (4)
J8 CONNECTOR
CONTROL PANEL
SENSING BULB
P8 CONNECTOR

Figure 4-6. Control Panel Removal

TS4120-370-14/4-6

l. Using wrenches, remove four bolts and nuts and remove control panel from air conditioner.

m. Very carefully, coil capillary line and mount sensing bulb in loop clamp provided on back of control panel.

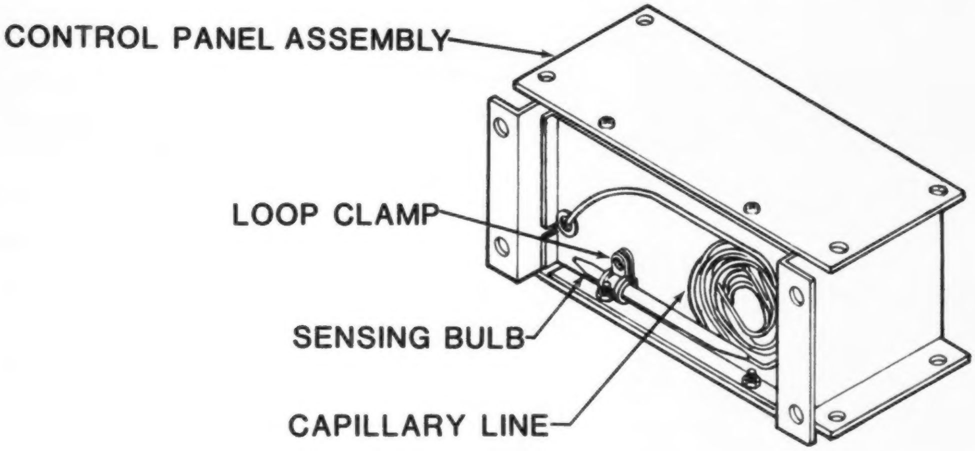

CONTROL PANEL ASSEMBLY
LOOP CLAMP
SENSING BULB
CAPILLARY LINE
TS4120-370-14/4-7

Figure 4-7. Sensing Bulb Secured for Remote Mounting

n. The control panel is provided with three sets of four holes. These holes are sized for use with 0.25 inch (0.64 cm) diameter hardware. The control panel can be mounted using the top, bottom, or rear face holes.

o. Care should be taken to locate the control panel and sensing bulb where there will be an accurate temperature indication.

NOTE

Do not locate control panel on thin outside walls or near heat producing equipment or lights.

p. Secure the control panel using appropriate hardware in the remote location.

q. Using screwdriver and wrench, install block-off panel using the four mounting screws and nuts removed from the control panel.

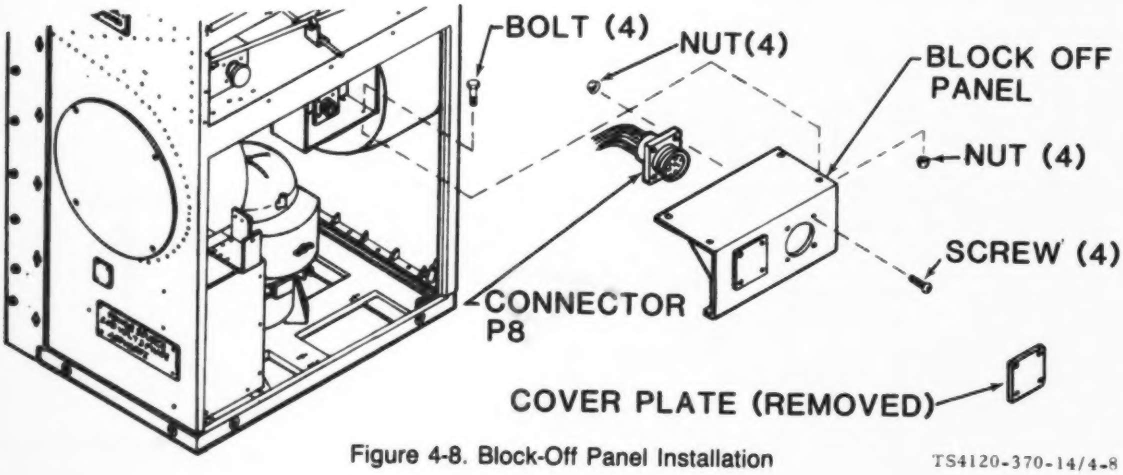

BOLT (4)
NUT(4)
BLOCK OFF PANEL
NUT (4)
SCREW (4)
CONNECTOR P8
COVER PLATE (REMOVED)
TS4120-370-14/4-8

Figure 4-8. Block-Off Panel Installation

NOTE

If your unit was not supplied with a block-off panel, order part (97403) 13214E3865-1.

r. Using screwdriver and wrench, remove four screws and nuts from righthand cover plate. Remove cover plate and install the P8 connector and harness to the block-off panel using the four screws and nuts as removed from cover plate. Retain the cover plate for possible future use.

s. Reinstall conditioned air intake grille, front fresh air damper knob, and lower front panel.

t. Fabricate an interconnecting cable/harness of the required length to connect the P8 block off mounted connector and the J8 control panel connector.

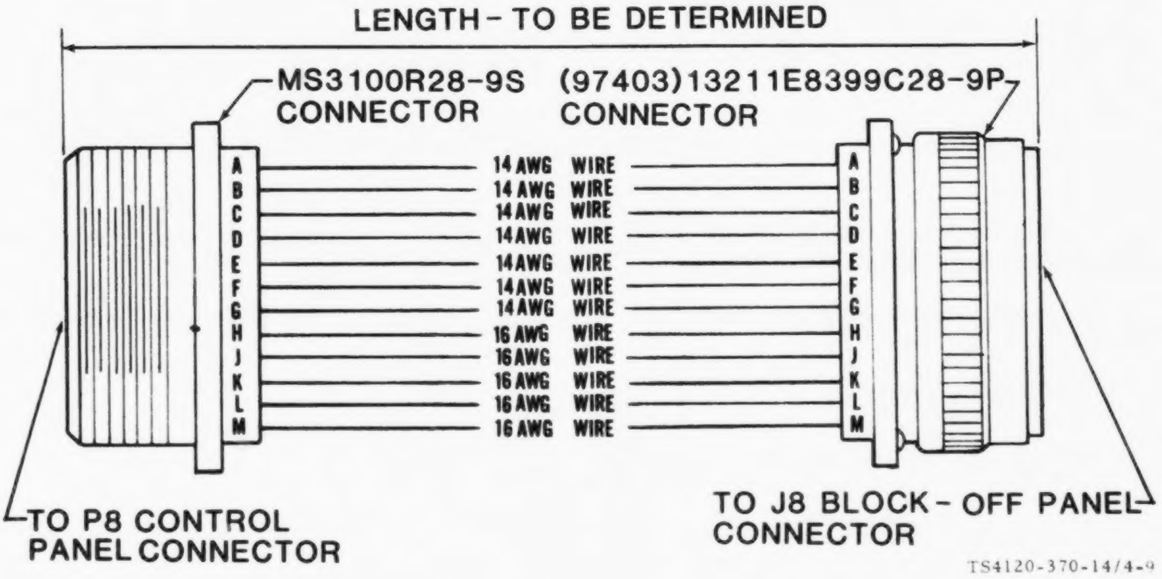

LENGTH - TO BE DETERMINED
MS3100R28-9S CONNECTOR
(97403)13211E8399C28-9P CONNECTOR
A 14 AWG WIRE A
B 14 AWG WIRE B
C 14 AWG WIRE C
D 14 AWG WIRE D
E 14 AWG WIRE E
F 14 AWG WIRE F
G 14 AWG WIRE G
H 16 AWG WIRE H
J 16 AWG WIRE J
K 16 AWG WIRE K
L 16 AWG WIRE L
M 16 AWG WIRE M
TO P8 CONTROL PANEL CONNECTOR
TO J8 BLOCK - OFF PANEL CONNECTOR
TS4120-370-14/4-9

Figure 4-9. Interconnecting Remote Control Cable Diagram

u. Install interconnecting cable.

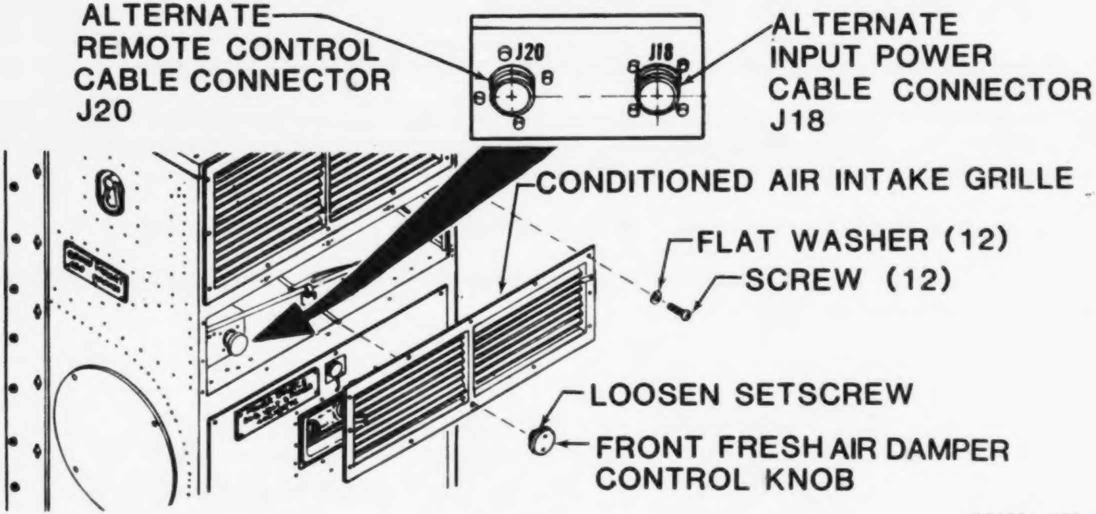
4-8. CABLE CONNECTIONS THROUGH RETURN (CONDITIONED AIR INTAKE) DUCT

This paragraph is applicable only when the conditioned air intake grille is to be removed from the unit and one or both of the alternate (J18 input power connector or J20 remote control connector) cable locations are to be used. These alternate cable connection locations permit cables to be routed through the return air ducting to the air conditioner.

WARNING

Be sure input power is disconnected before doing any work inside the air conditioner cabinet. Voltages used can kill.

a. Using allen wrench, loosen setscrew and remove front fresh air damper control knob.

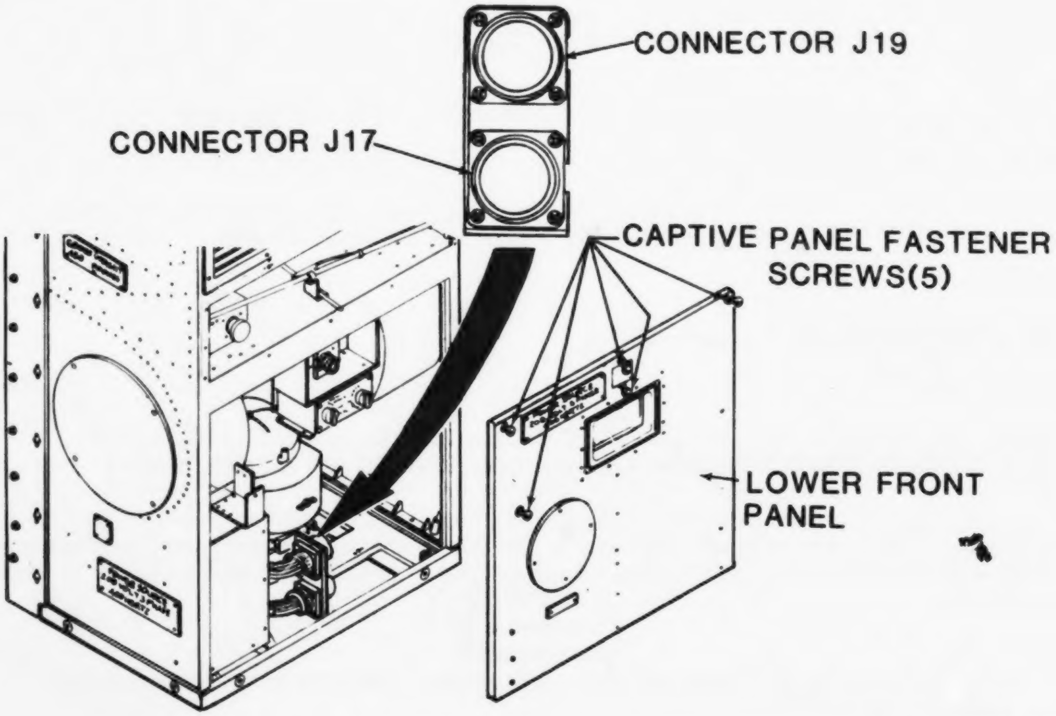

ALTERNATE REMOTE CONTROL CABLE CONNECTOR J20
J20
J18
ALTERNATE INPUT POWER CABLE CONNECTOR J18
CONDITIONED AIR INTAKE GRILLE
FLAT WASHER (12)
SCREW (12)
LOOSEN SETSCREW
FRONT FRESH AIR DAMPER CONTROL KNOB

TS4120-370-14/4-10

Figure 4-10. Return Air Duct Cable Connectors

b. Using screwdriver, remove twelve screws and flat washers. Remove conditioned air intake grille. Be careful not to damage grille gaskets. Store grille in a safe place for possible future use.

c. Check that electrical connector cover (for J1 connector in lower front panel) has been unscrewed from connector.


CONNECTOR J19
CONNECTOR J17
CAPTIVE PANEL FASTENER SCREWS(5)
LOWER FRONT PANEL

TS4120-370-14/4-11

Figure 4-11. Lower Front Panel Removal

d. Using screwdriver, loosen five captive panel fastener screws.

e. Tip top of lower front panel away from unit and lift panel up to clear flange on bottom of panel.

f. If input power cable is to be connected through return air duct:

(1) Using screwdriver and wrench, remove four screws and nuts from J1 connector.

(2) Pull J1 connector and harness free from mounting plate.

(3) Remove rubber gasket and electrical cover cap and chain and store electrical cover cap and chain in a safe place for possible future use.

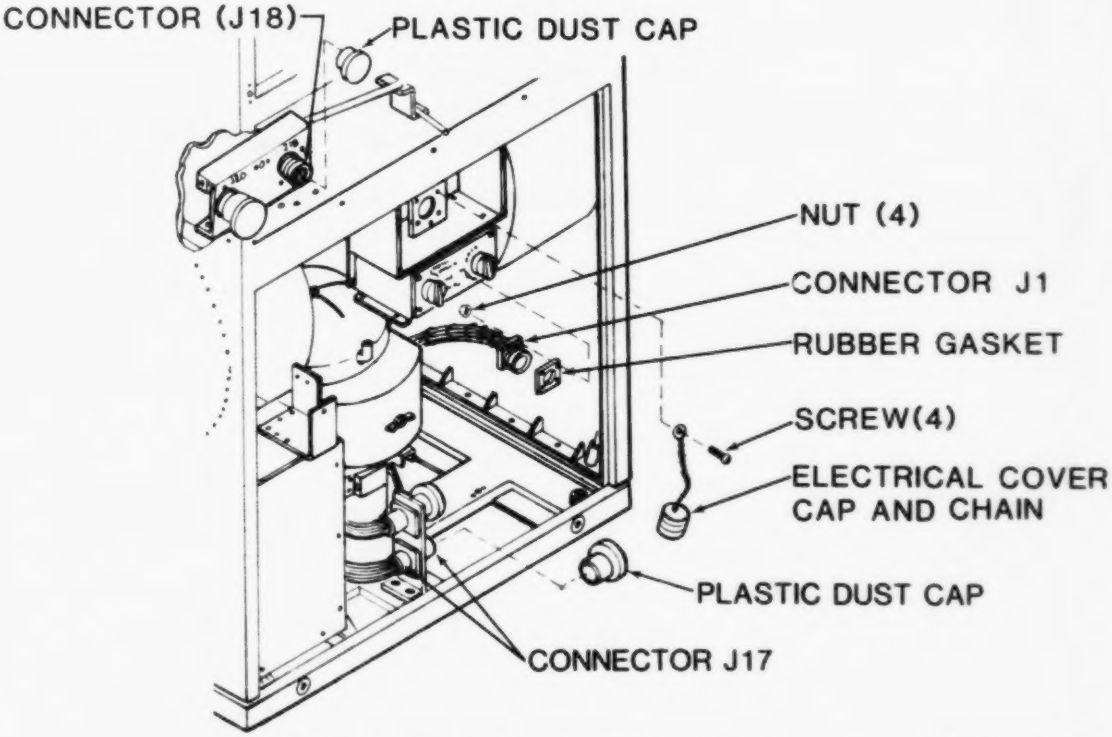

CONNECTOR (J18)
PLASTIC DUST CAP
NUT (4)
CONNECTOR J1
RUBBER GASKET
SCREW(4)
ELECTRICAL COVER CAP AND CHAIN
PLASTIC DUST CAP
CONNECTOR J17

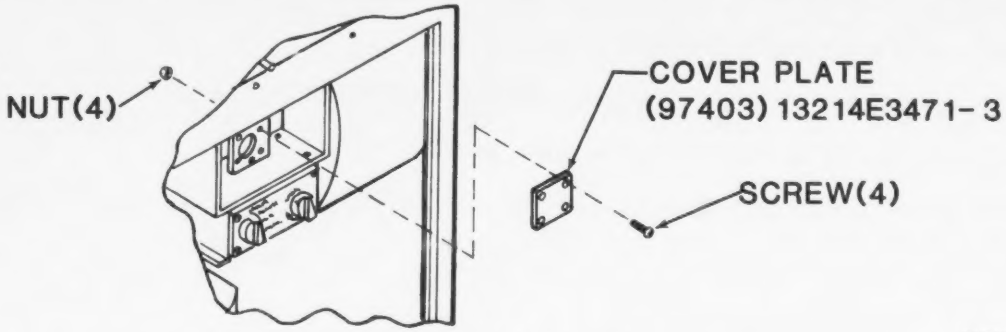
Figure 4-12. Alternate Power Connection

TS4120-370-14/4-12

(4) Remove plastic dust caps from connectors J17 and J18. Store caps in a safe place for possible future use.

(5) Connect J1 connector and harness to J17 connector and harness.

(6) Using screwdriver and wrench, install cover plate (97403) 13214E3471-3 to seal original J1 connector opening. Use original J1 connector mounting hardware removed in step (1) and gasket removed in step (3) above.


NUT(4)
COVER PLATE
(97403) 13214E3471- 3
SCREW(4)

TS4120-370-14/4-13

Figure 4-13. Cover Plate Installation

g. If control panel is to be mounted in a remote location and remote control cable connector is to be connected through return air duct:

(1) See paragraph 4-7.f through 4-7.q for control panel relocation.

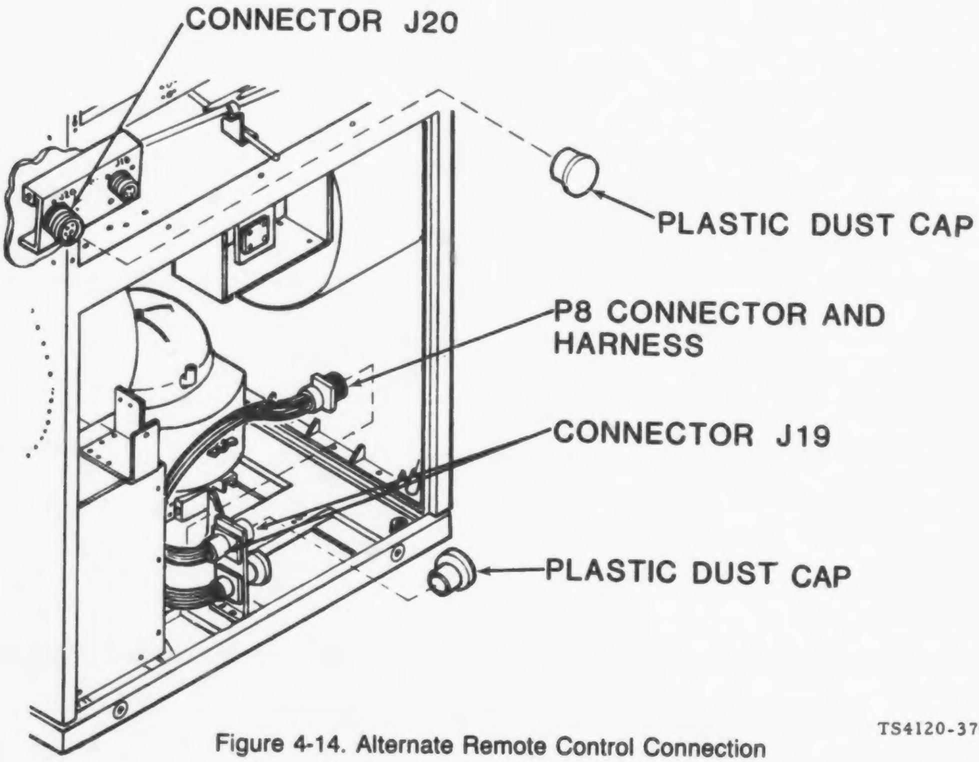
NOTE

Fabrication of interconnecting remote control cable described in paragraph 4-7.t will apply except that it will be connected to the J20 connector on the unit in place of the J8 connector on block off.

(2) Remove plastic dust caps from connectors J19 and J20. Store caps in a safe place for possible future use.

(3) Connect P8 connector and harness to J19 connector and harness.

h. Reinstall lower front panel.


CONNECTOR J20
PLASTIC DUST CAP
P8 CONNECTOR AND HARNESS
CONNECTOR J19
PLASTIC DUST CAP

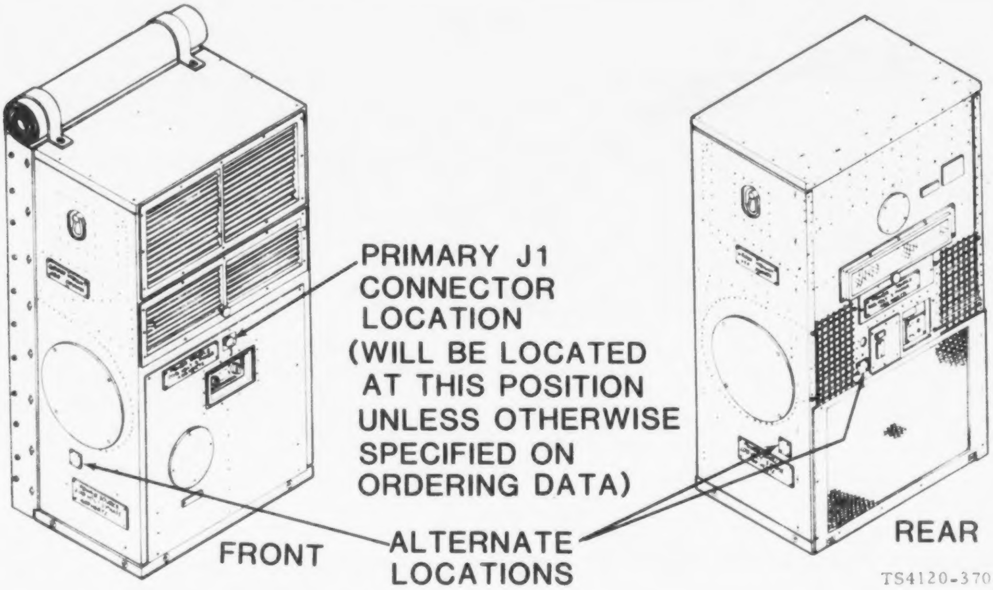
TS4120-370-14/4-14

Figure 4-14. Alternate Remote Control Connection

4-9. ALTERNATE INPUT POWER CABLE CONNECTOR (J1) LOCATIONS

a. See paragraph 4-8 for cable connections through return (conditioned air intake) duct.

b. See figure 4-15 for alternate input power cable connection (J1) locations.


PRIMARY J1
CONNECTOR
LOCATION
(WILL BE LOCATED
AT THIS POSITION
UNLESS OTHERWISE
SPECIFIED ON
ORDERING DATA)
FRONT
ALTERNATE
LOCATIONS
REAR

TS4120-370-14/4-15

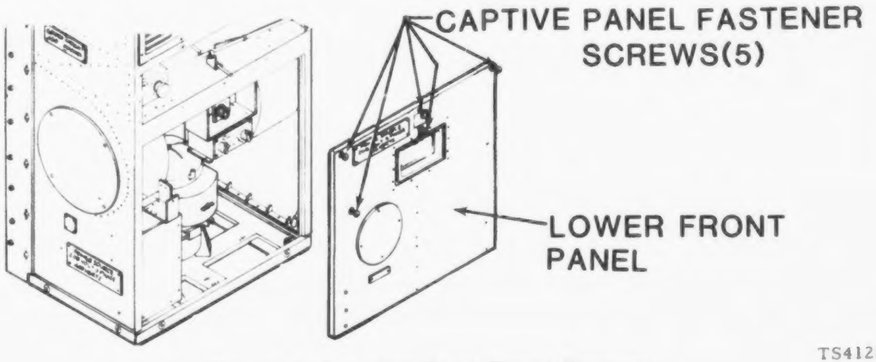
Figure 4-15. Alternate Input Power Cable Connector (J1) Locations

c. If input power cable connection (J1) is to be relocated to one of the alternate locations:

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

(1) Check that electrical connector cover has been unscrewed from connector.


CAPTIVE PANEL FASTENER
SCREWS(5)
LOWER FRONT
PANEL

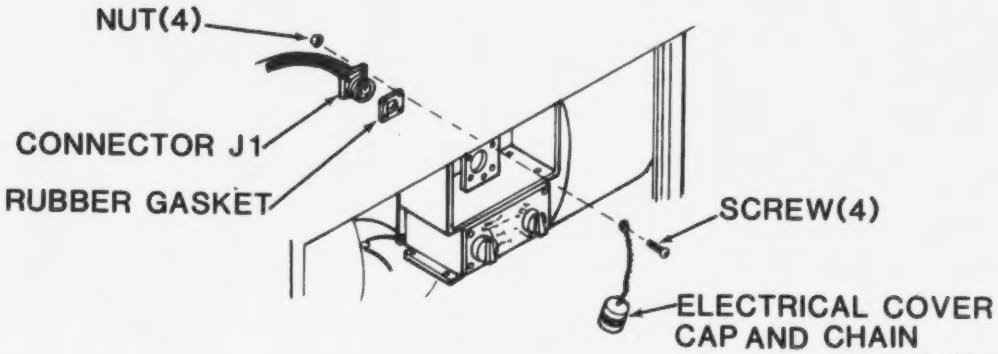
TS4120-370-14/4-16

Figure 4-16. Lower Front Panel Removal

(2) Using screwdriver, loosen five captive panel fastener screws.

(3) Tip top of lower front panel away from unit and lift panel up to clear flange on bottom of panel.

(4) Using screwdriver and wrench, remove four screws and nuts from J1 connector.

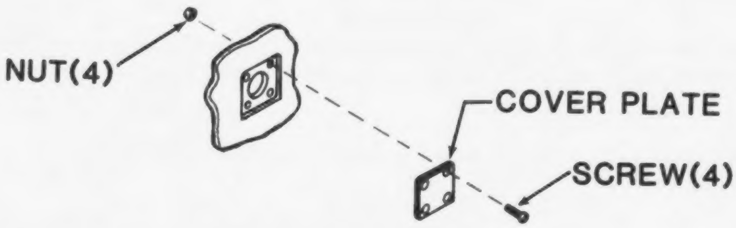


TS4120-370-14/4-17

Figure 4-17. J1 Connector Removal

(5) Remove J1 connector and harness, rubber gasket, and electrical cover cap and chain from mounting plate.

(6) Using screwdriver and wrench, remove four screws and nuts from cover plate at alternate connector location.



TS4120-370-14/4-18

Figure 4-18. Cover Plate Removal

(7) Using screwdriver and wrench, install connector J1, electrical cover cap and chain, and rubber gasket in new location with four screws and nuts.

(8) Using screwdriver and wrench, install cover plate on mounting plate where J1 connector was removed with four screws and nuts.

(9) Reinstall lower front panel.

4-10. INSTALLATIONS THAT REQUIRE REMOVAL OF FABRIC COVER

Some installations require removal of the condenser side fabric cover. This generally applies only when the air conditioner is positioned inside with condenser and fresh air openings ducted to the outside.

NOTE

If air conditioner is to be installed with condenser side (rear) exposed, the fabric cover should be left in place if possible.

a. Using screwdriver, remove twenty-six screws and flat washers and four lock washers.

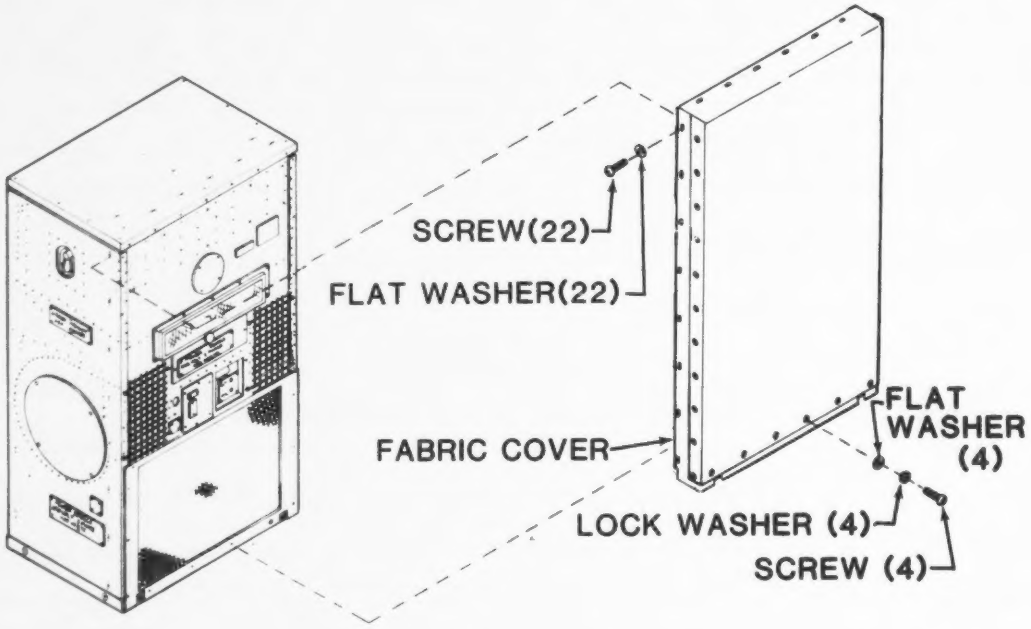


Figure 4-19. Fabric Cover Removal

TS4120-370-14/4-19

b. Carefully remove the fabric cover. Store the cover in a safe place for future use.

c. Using screwdriver, reinstall all hardware removed in step a.

4-11. INSTALLATION INSTRUCTIONS

All alterations to the shelter or facility into which the air conditioner is to be installed should be complete before installation of air conditioner.

a. Attach an overhead hoist, sling, and spreader bar to the lifting fittings on each side of the cabinet.

b. Move air conditioner into position and aline mounting holes.

c. Secure unit with appropriate mounting hardware.

Base - .4375-14 UNC-2B (4 holes)

Rear - .3125-24 UNF-3B (6 holes)

.190-32 UNF-3B (10 holes)

d. Seal all openings around cutouts for air conditioner; air and water tight. Use gasket, caulking, or other suitable material.

e. The air conditioner is provided with eight drain holes in base. (See figure 4-2.) Remove plugs from all drains possible for most complete drainage of condensate water. If water from these drains will be objectionable or create a hazard, external overboard drains can be connected. Use standard ½-14 NPT male pipe fittings to connect base drains. Any type of hose or tubing may be used as a drain line. The drain line should lead to an appropriate facility drain, storm sewer, dry sump, or an acceptable outside area. Be sure the entire length of the drain line is at the same height, or lower than the base to ensure gravity drainage.

f. Install a 10 AWG minimum ground wire between air conditioner cabinet and an adequate earth ground.

g. Fabricate a power cable. (See para 4-12.)

WARNING

The following test must be conducted with the power on. Use extreme caution.

CAUTION

Do not connect P1 connector to air conditioner before making following checks.

h. Connect power cable to a power source of 208 volt, 3 phase, 400 hertz for model F36T4-2S and F36T4-2SA or 50/60 hertz for model F36T-2S. (See figures 4-12 and 4-21.)

(1) Apply power to power cable

(2) Use a multimeter set to AC voltage range of at least 250 volts for following tests.

(3) Measure voltage between pin D of connector P1 and a good chassis ground. Voltage must be zero (0). If more than zero voltage is observed, disconnect cable and check power source. Correct problem at power source or at cable connection as indicated.

(4) With zero voltage on pin D of P1 connector, check voltages between remaining pins as shown on following chart.

P1 CONNECTOR

Measure from pin	To Pin			
	A	B	C	D
A	N/A	208	208	120
B	208	N/A	208	120
C	208	208	N/A	120
D	120	120	120	N/A

Voltages should be approximately as shown. If voltages are not within ten volts of those indicated on chart, disconnect power. Locate and correct problem.

CAUTION

Check that mode selector switch is OFF.

(5) After proper voltages are indicated on all pins of connector P1, connect P1 to connector J1 on air conditioner.

NOTE

The following steps require two people. One must be at control panel. The other must be in position at rear of air conditioner to see condenser fan rotation. (Condenser fans can be seen through condenser air outlet grilles, figure 1-2, item 2.)

(6) Remove service valve cover (para 4-68) or lower front panel (para 4-25).

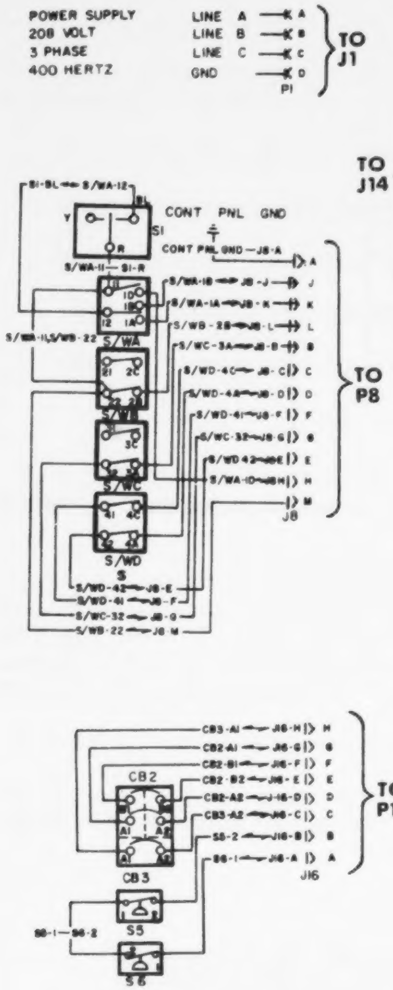
(7) The person at control panel should turn mode selector switch to COOL and immediately back to OFF.

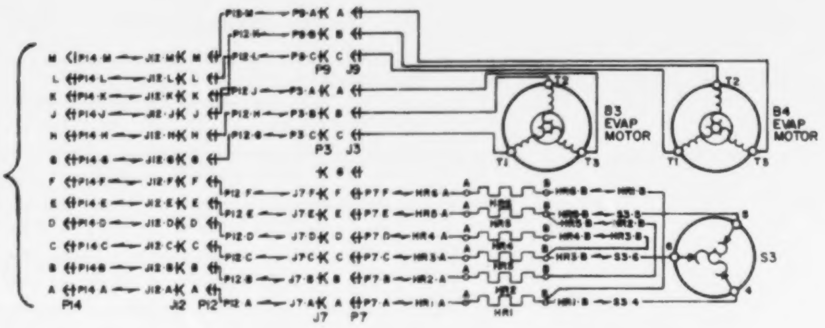
(8) One person should observe the condenser fans to determine the direction of rotation. (See figure 4-84 for proper fan rotation.)

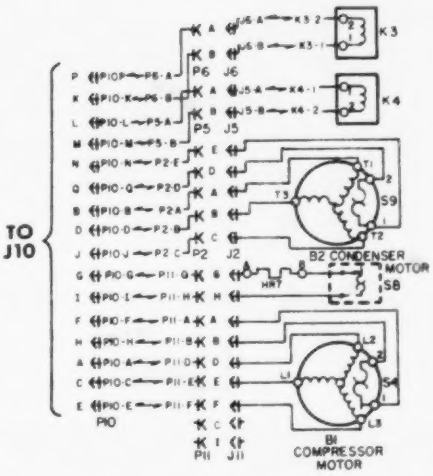
(9) If fan rotation is backward, unit power cable is not wired properly. Exchange wires connected to pins A and B at power source connection and repeat steps (7) and (8) above.

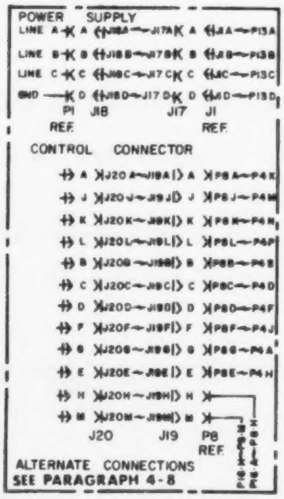
(10) Check unit operation in accordance with para 2-6 and 2-7.

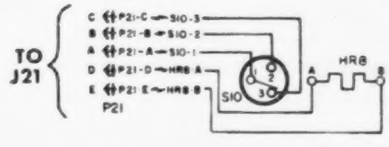
i. See air conditioner wiring diagram, figure 4-20, and electrical schematic, figure 4-20A, for additional wiring information.


POWER SUPPLY
208 VOLT
3 PHASE
400 HERTZ
LINE A
LINE B
LINE C
GND
P1
TO J1
TO J14
CONT PNL GND
S1
S/WA
S/WB
S/WC
S/WD
S
TO P8
J8
CB2
CB3
S5
S6
TO P16
J16


P14
J2
P12
J7
P7
P9
J9
P3
J3
B3 EVAP MOTOR
B4 EVAP MOTOR
T1
T2
T3
HR1
HR2
HR3
HR4
HR5
HR6
S3


K3
K4
P6
J6
P5
J5
TO J10
P10
P2
J2
B2 CONDENSER MOTOR
S9
HR7
S8
P11
J11
S4
B1 COMPRESSOR MOTOR
L1
L2
L3


POWER SUPPLY
LINE A
LINE B
LINE C
GND
P1
J18
J17
J1
REF.
REF.
CONTROL CONNECTOR
J20
J19
P8
REF.
ALTERNATE CONNECTIONS
SEE PARAGRAPH 4-8


TO J21
P21
S10
HR8

SWITCH POSITION						
	CONTACT NO.	1 HI HEAT	2 LO HEAT	3 OFF	4 VENT	5 COOL
S/WA	12 AND 1A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	12 AND 1B	OPEN	OPEN	OPEN	OPEN	CLOSED
	11 AND 1D	OPEN	OPEN	OPEN	OPEN	CLOSED
S/WB	22 AND 2B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
S/WC	32 AND 3A	CLOSED	OPEN	OPEN	OPEN	OPEN
S/WD	42 AND 4A	CLOSED	OPEN	OPEN	OPEN	OPEN
	41 AND 4C	CLOSED	OPEN	OPEN	OPEN	OPEN

LEGEND	
SYMBOL	DESCRIPTION
A1	FILTER ASSEMBLY
B1	COMPRESSOR MOTOR
B 2	CONDENSER MOTOR
B3,B4	EVAPORATOR MOTOR
CB1-CB3	CIRCUIT BREAKER
HR1-6	HEATING ELEMENT
HR 7	HEATING ELEMENT, CPRSR.
HR 8	HEATING ELEMENT
J1	CONNECTOR, RECEPTACLE
J2	CONNECTOR, RECEPTACLE
J3	CONNECTOR, PLUG
J4	CONNECTOR, RECEPTACLE
J5	CONNECTOR, RECEPTACLE
J6	CONNECTOR, RECEPTACLE
J7	CONNECTOR, RECEPTACLE
J8	CONNECTOR, PLUG
J9	CONNECTOR, PLUG
J10	CONNECTOR, RECEPTACLE
J11	CONNECTOR, RECEPTACLE
J12	CONNECTOR, RECEPTACLE
J13	CONNECTOR, RECEPTACLE
J14	CONNECTOR, RECEPTACLE
J16	CONNECTOR, RECEPTACLE
J17	CONNECTOR, PLUG
J18	CONNECTOR, RECEPTACLE
J19	CONNECTOR, PLUG
J20	CONNECTOR, RECEPTACLE
J21	CONNECTOR, RECEPTACLE
K1	RELAY, HEATER
K3,4	VALVE, SOLENOID
K6	RELAY, TIME DELAY
K7	RELAY, CONDENSER
K8	RELAY, EVAPORATOR
K9	RELAY, COMPRESSOR
K10	RELAY, CONTROL
P1	CONNECTOR, PLUG
P2	CONNECTOR, PLUG
P3	CONNECTOR, RECEPTACLE
P4	CONNECTOR, PLUG
P5	CONNECTOR, PLUG
P6	CONNECTOR, PLUG
P7	CONNECTOR, PLUG
P8	CONNECTOR, RECEPTACLE
P9	CONNECTOR, RECEPTACLE
P10	CONNECTOR, PLUG
P11	CONNECTOR, PLUG
P12	CONNECTOR, PLUG
P13	CONNECTOR, PLUG
P14	CONNECTOR, PLUG
P16	CONNECTOR, PLUG
S	SWITCH, ROTARY
S1	THERMOSTAT
S3	THERMOSTAT, HEATER
S4	THERMOSTAT - CPRSR. MOTOR
S5	SWITCH, HIGH PRESS. CUTOUT
S6	SWITCH, LOW PRESS. CUTOUT
S8	THERMOSTAT (WHEN REQD.)
S9	THERMOSTAT - COND. MOTOR
S10	THERMOSTAT
T	TRANSFORMER
TB1	TERMINAL BLOCK
TB 2	TERMINAL BLOCK
P21	CONNECTOR, PLUG

Figure 4-20. Wiring Diagram (Sheet 1 of 4) for F36T4-2S only
See Sheet 3 and 4 for F36T4-2SA and F36T-2S

TS4120-370-14/4-20/1

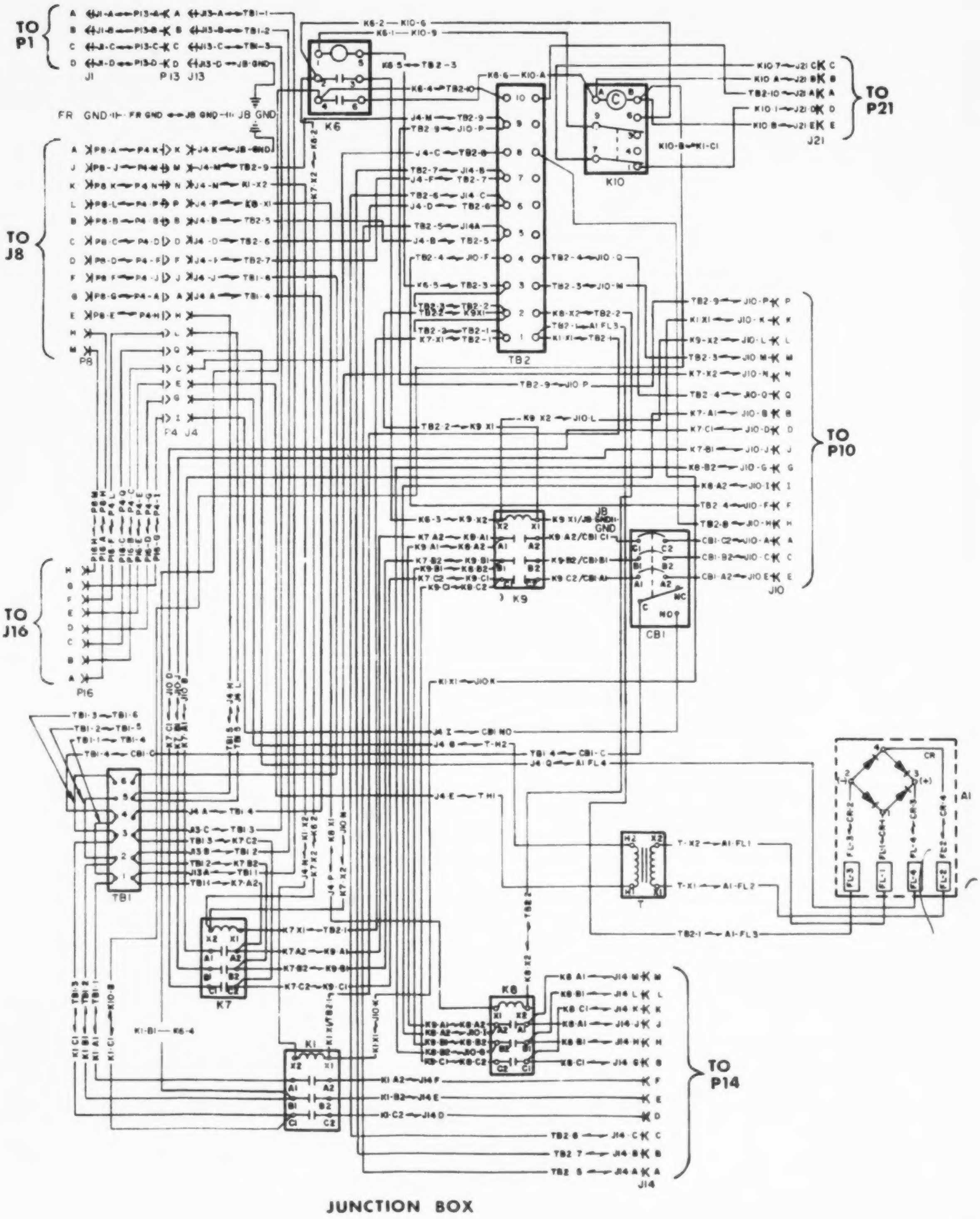
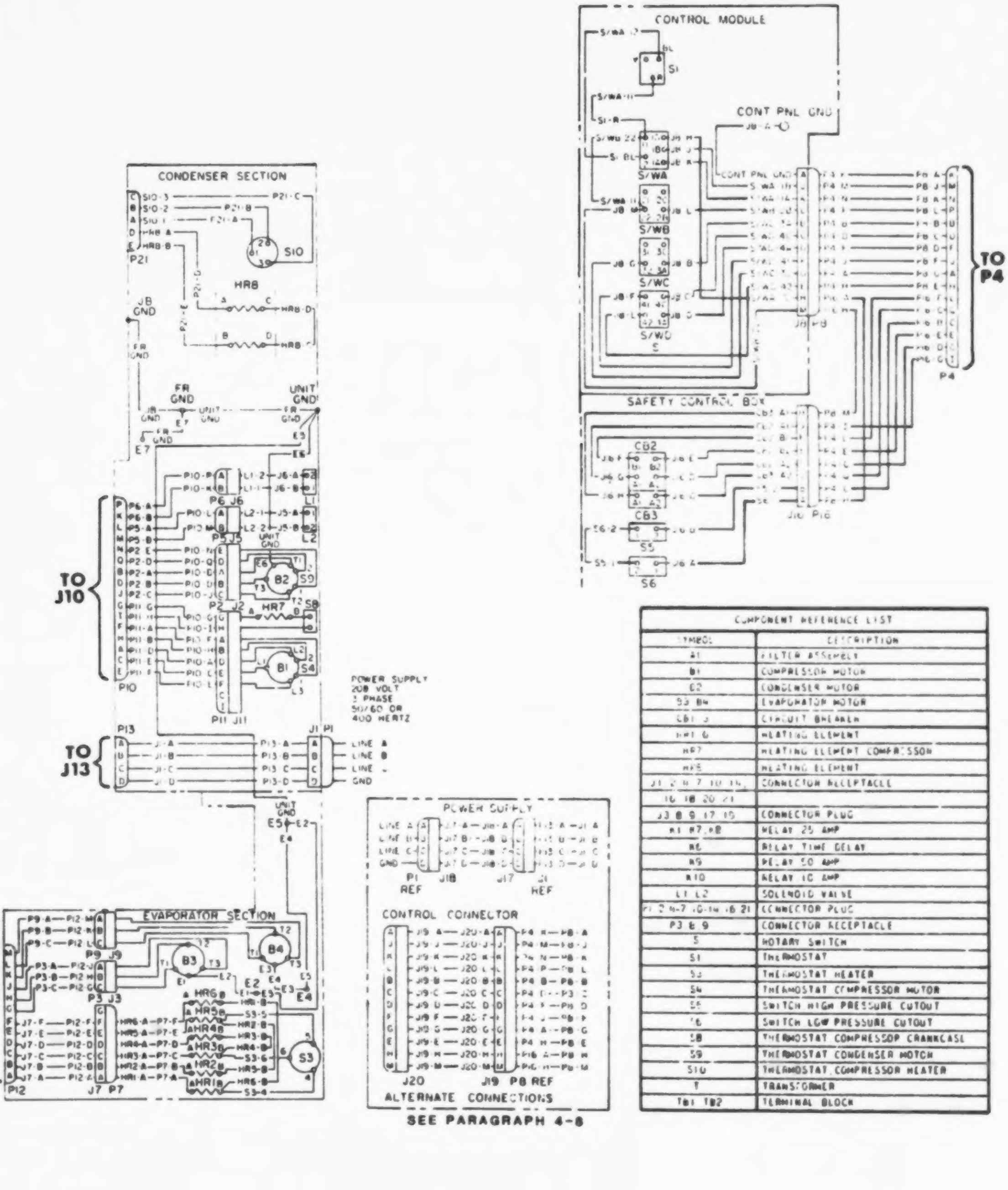

TO P1
J1
P13
J13
FR GND
JB GND
K6
K10
TO P21
J21
TO J8
P8
P4
J4
TB2
TO P10
J10
K9
CB1
TO J16
P16
TB1
T
A1
CR
K7
K8
K1
TO P14
J14
JUNCTION BOX

Figure 4-20. Wiring Diagram (Sheet 2 of 4) for
F36T4-2S only
See Sheet 3 and 4 for F36T4-2SA and F36T-2S

TS4120-370-14/4-20/2


CONTROL MODULE
CONT PNL GND
S/WA
S/WB
S/WC
S/WD
J8 P8
TO P4
P4
SAFETY CONTROL BOX
CB2
CB3
S5
S6
J16 P16
CONDENSER SECTION
P21
S10
HR8
J8 GND
FR GND
FR GND
UNIT GND
E7
E3
E6
P6 J6
P5 J5
UNIT GND
B2
S9
HR7
S8
B1
S4
TO J10
P10
P2 J2
P11 J11
POWER SUPPLY 208 VOLT 3 PHASE 50/60 OR 400 HERTZ
P13
TO J13
J1 P1
LINE A
LINE B
LINE C
GND
UNIT GND
E5
E2
E4
EVAPORATOR SECTION
P9 J9
B3
B4
P3 J3
HR6
HR5
HR4
HR3
HR2
HR1
S3
TO J12
P12
J7 P7
POWER SUPPLY
P1 REF
J18
J17
J1 REF
CONTROL CONNECTOR
J20
J19 P8 REF
ALTERNATE CONNECTIONS

SEE PARAGRAPH 4-8

COMPONENT REFERENCE LIST	
SYMBOL	DESCRIPTION
A1	FILTER ASSEMBLY
B1	COMPRESSOR MOTOR
B2	CONDENSER MOTOR
B3 B4	EVAPORATOR MOTOR
CB1 3	CIRCUIT BREAKER
HR1 6	HEATING ELEMENT
HR7	HEATING ELEMENT COMPRESSOR
HR8	HEATING ELEMENT
J1 2 4 7 10 14,	CONNECTOR RECEPTACLE
16 18 20 21	
J3 8 9 17 19	CONNECTOR PLUG
K1 K7,K8	RELAY 25 AMP
K6	RELAY TIME DELAY
K9	RELAY 50 AMP
K10	RELAY 10 AMP
L1 L2	SOLENOID VALVE
P1 2 4-7 10-14 16 21	CONNECTOR PLUG
P3 & 9	CONNECTOR RECEPTACLE
S	ROTARY SWITCH
S1	THERMOSTAT
S3	THERMOSTAT HEATER
S4	THERMOSTAT COMPRESSOR MOTOR
S5	SWITCH HIGH PRESSURE CUTOUT
S6	SWITCH LOW PRESSURE CUTOUT
S8	THERMOSTAT COMPRESSOR CRANKCASE
S9	THERMOSTAT CONDENSER MOTOR
S10	THERMOSTAT COMPRESSOR HEATER
T	TRANSFORMER
TB1 TB2	TERMINAL BLOCK

Figure 4-20. Wiring Diagram (Sheet 3 of 4)
for F36T4-2SA and F36T-2S only
See Sheet 1 and 2 for F36T4-2S

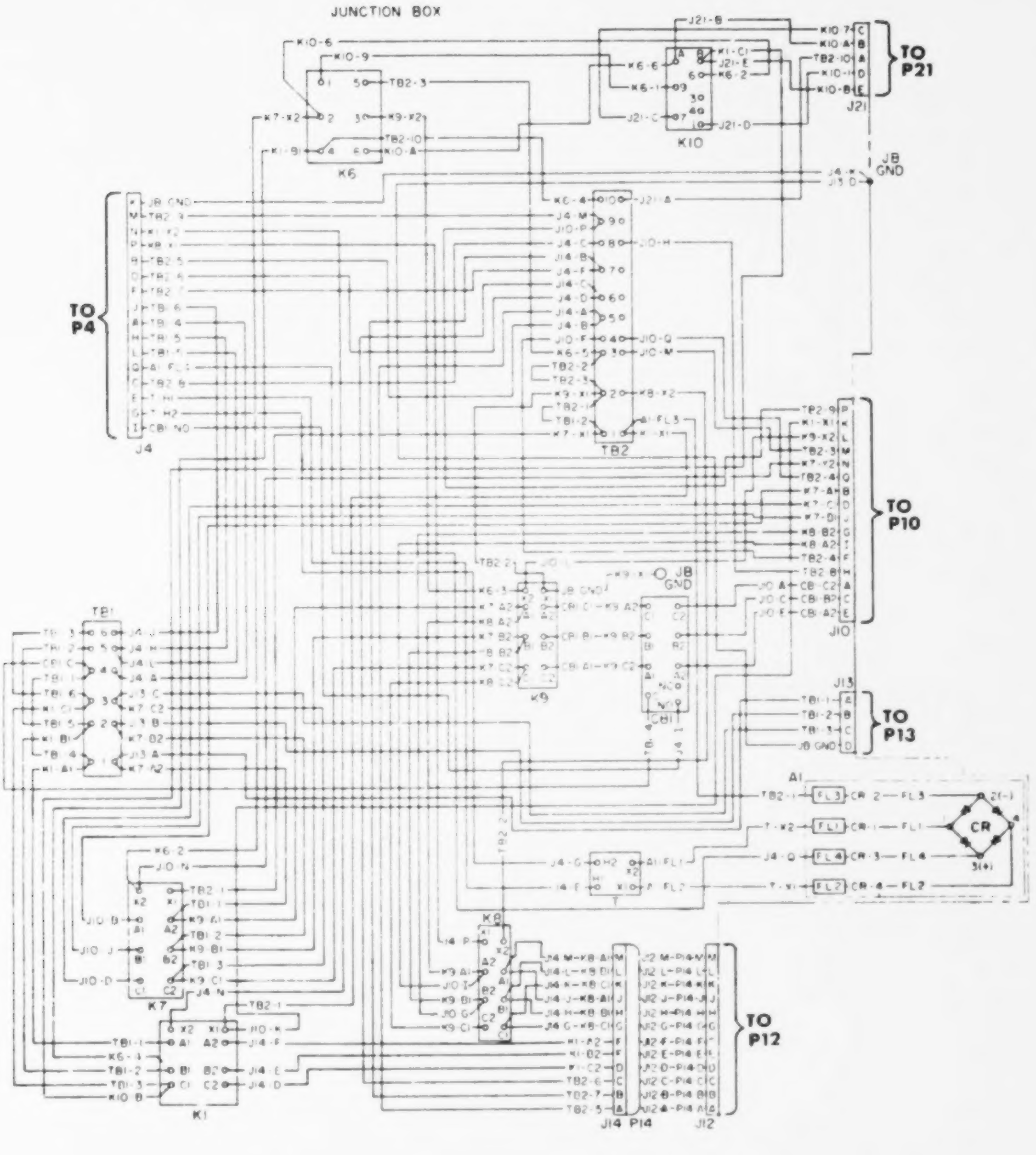
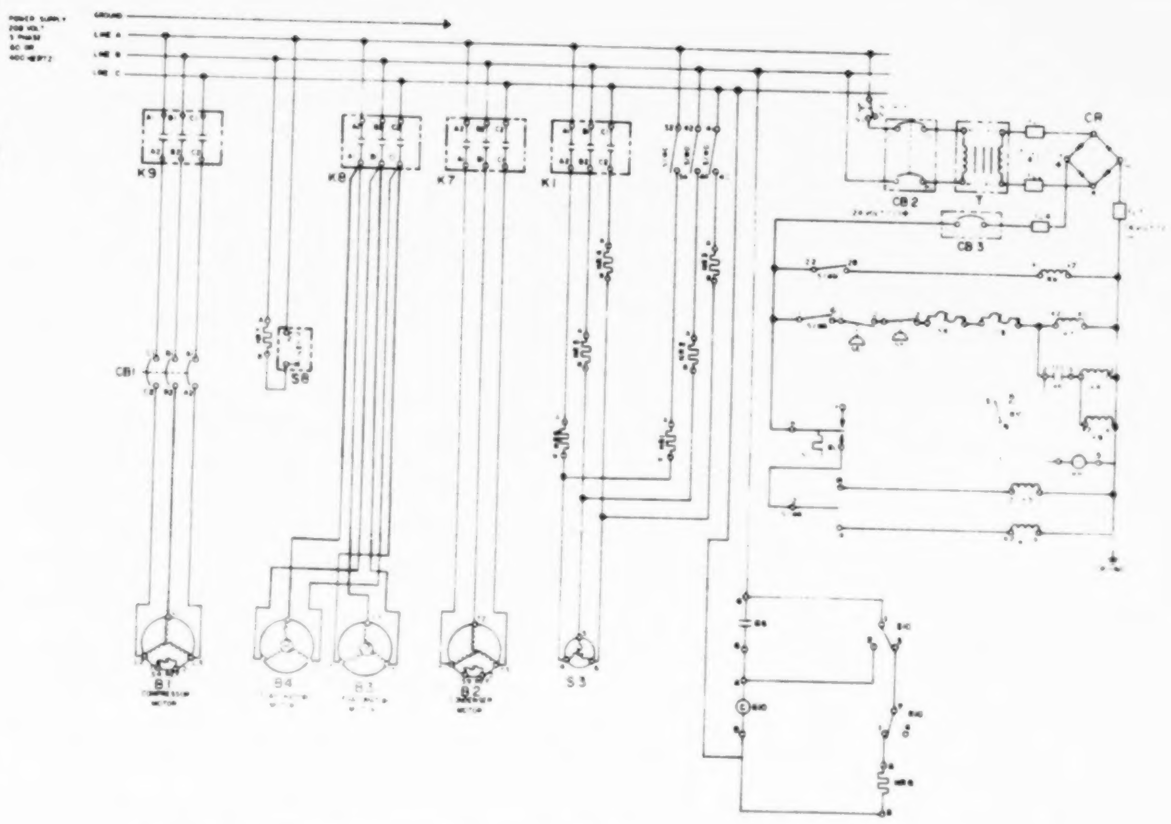

JUNCTION BOX
TO P21
J21
K10
K6
JB GND
TO P4
J4
TB2
TO P10
J10
K9
CB1
TO P13
J13
TB1
A1
CR
T
K7
K8
TO P12
K1
J14
P14
J12

Figure 4-20. Wiring Diagram (Sheet 4 of 4)
for F36T4-2SA and F36T-2S only
See Sheet 1 and 2 for F36T4-2S



LEGEND	
SYMBOL	DESCRIPTION
B1	COMPRESSOR MOTOR
B2	CONDENSER MOTOR
B3,B4	EVAPORATOR MOTOR
CB1-CB3	CIRCUIT BREAKER
CR	RECTIFIER, SEMICONDUCTOR DEVICE
HR1-6	HEATING ELEMENT
HR-7	HEATING ELEMENT, CRANKCASE
K1	RELAY, 25 AMP, HEATER
K3	VALVE SOLENOID, LIQUID LINE
K4	VALVE, SOLENOID, PRESSURE EQUALIZATION
K6	RELAY, TIME DELAY
K7	RELAY, 25 AMP, CONDENSER
K8	RELAY, 25 AMP, EVAPORATOR
K9	RELAY, 50 AMP, COMPRESSOR
S	SWITCH, ROTARY
S1	THERMOSTAT, TEMPERATURE CONTROLLER
FL1-4	FILTER, RFI
S3	THERMOSTAT-HEATER COMPARTMENT
S4	THERMOSTAT- COMPRESSOR MOTOR
S5	SWITCH, HIGH PRESSURE CUTOUT
S6	SWITCH, LOW PRESSURE CUTOUT
S8	THERMOSTAT-CRANKCASE
S9	THERMOSTAT- CONDENSER MOTOR
T	TRANSFORMER
HR8	HEATER-COMPRESSOR
S10	THERMOSTAT
K10	RELAY, CONTROL

		SWITCH POSITION				
	CONTACT NO	1 HI HEAT	2 LO HEAT	3 OFF	4 VENT	5 COOL
S/WA	12 & 1A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	12 & 1B	OPEN	OPEN	OPEN	OPEN	CLOSED
	11 & 1D	OPEN	OPEN	OPEN	OPEN	CLOSED
S/WB	22 & 2B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
S/WC	32 & 3A	CLOSED	OPEN	OPEN	OPEN	OPEN
S/WD	42 & 4A	CLOSED	OPEN	OPEN	OPEN	OPEN
	41 & 4C	CLOSED	OPEN	OPEN	OPEN	OPEN

NOTES:

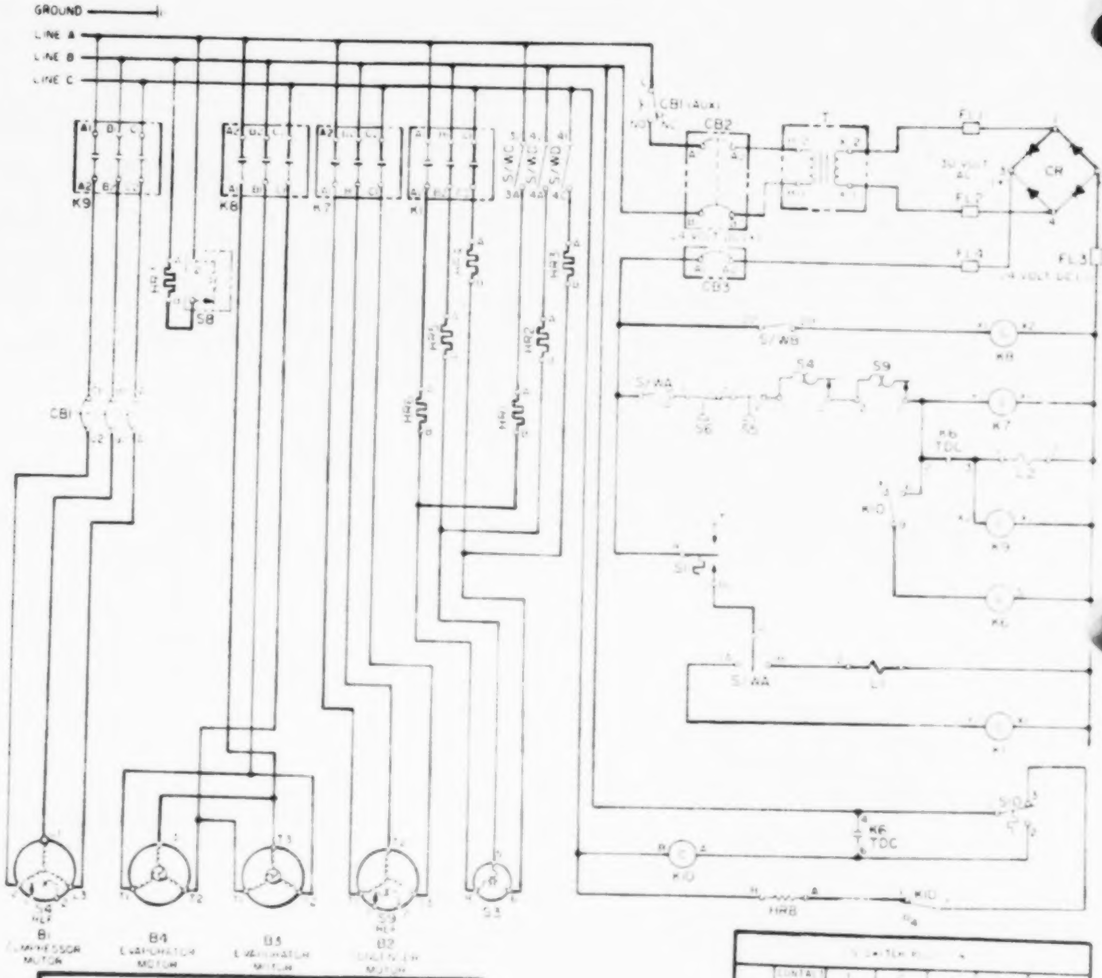
1 FOR INTERPRETATION OF:

ELECTRICAL AND ELECTRONICS SYMBOLS, SEE ANS Y32.2

ELECTRICAL DESIGNATIONS, SEE ANS Y32.16

Figure 4-20A. Electrical Schematic (Sheet 1 of 2)
for F36T4-2S only
See Sheet 2 for F36T4-2SA and F36T-2S

TS4120-370-14/4-20/1


GROUND
LINE A
LINE B
LINE C
K9
K8
K7
K1
S/WC
S/WB
S/WD
CB1 (AUX)
CB2
T
FL1
FL2
FL3
30 VOLT AC
CR
CB3
24 VOLT DC
HR1
HR2
HR3
HR4
HR5
HR6
HR7
S8
CB1
S/WB
S/WA
S4
S9
S6
S5
K6 TDC
L2
K10
S1
L1
S/WA
S10
K6 TDC
K10
HR8
S4 HLF
B1 COMPRESSOR MOTOR
B4 EVAPORATOR MOTOR
B3 EVAPORATOR MOTOR
S9 HLF
B2 CONDENSER MOTOR
S3

COMPONENT REFERENCE LIST			
B1	COMPRESSOR MOTOR	K10	RELAY 10 AMP
B2	CONDENSER MOTOR	L1	VALVE SOLENOID LIQUID LINE
B3 B4	EVAPORATOR MOTOR	L2	VALVE SOLENOID PRESSURE EQUALIZATION
CB1	CIRCUIT BREAKER	S	SWITCH ROTARY
CB2	CIRCUIT BREAKER	S1	THERMOSTAT TEMPERATURE CONTROLLER
CB3	CIRCUIT BREAKER	S3	THERMOSTAT HEATER COMPARTMENT
CR	RECTIFIER SEMICONDUCTOR DEVICE	S4	THERMOSTAT COMPRESSOR MOTOR
FL1-4	INTERFERENCE FILTER ASSEMBLY	S5	SWITCH HIGH PRESSURE CUTOUT
HR1-6	HEATING ELEMENT	S6	SWITCH LOW PRESSURE CUTOUT
HR7	HEATER CRANKCASE	S8	THERMOSTAT CRANKCASE
HR8	HEATER COMPRESSOR	S9	THERMOSTAT CONDENSER MOTOR
K1 K7 K8	RELAY 25 AMP	S10	THERMOSTAT COMPRESSOR HEATER
K6	RELAY TIME DELAY	T	TRANSFORMER
K9	RELAY 60 AMP		

S SWITCH POSITION						
	CONTACT NO	1 HI HEAT	2 LO HEAT	3 OFF	4 VENT	5 COOL
S-WA	1C AND 1A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	1C AND 1B	OPEN	OPEN	OPEN	OPEN	CLOSED
	1C AND 1D	OPEN	OPEN	OPEN	OPEN	CLOSED
S-WB	2C AND 2A	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
S-WC	3C AND 3A	CLOSED	OPEN	OPEN	OPEN	OPEN
S-WD	4C AND 4A	CLOSED	OPEN	OPEN	OPEN	OPEN
	41 AND 4C	CLOSED	OPEN	OPEN	OPEN	OPEN

Figure 4-20A. Electrical Schematic (Sheet 2 of 2) for F36T4-2SA and F36T-2S only See Sheet 1 for F36T4-2S

4-12. INPUT POWER CABLE

a. Determine length.

b. Fabricate input power cable in accordance with figure 4-21.

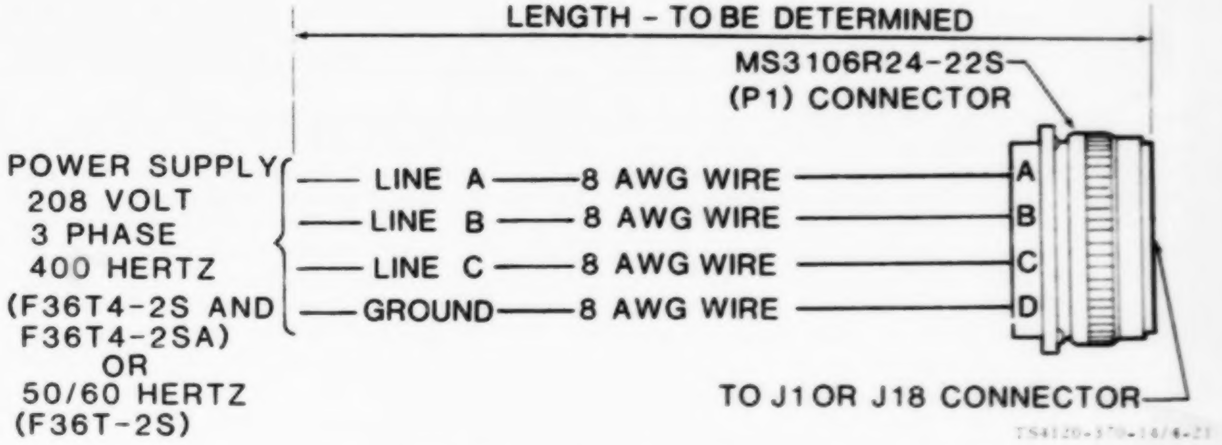

LENGTH - TO BE DETERMINED
MS3106R24-22S
(P1) CONNECTOR
POWER SUPPLY
208 VOLT
3 PHASE
400 HERTZ
(F36T4-2S AND
F36T4-2SA)
OR
50/60 HERTZ
(F36T-2S)
LINE A
LINE B
LINE C
GROUND
8 AWG WIRE
8 AWG WIRE
8 AWG WIRE
8 AWG WIRE
A
B
C
D
TO J1 OR J18 CONNECTOR
TS4120-370-14/4-21

Figure 4-21. Input Power Cable Diagram

Section III LUBRICATION

4-13. GENERAL

The refrigerant compressor and its drive motor are hermetically sealed in a canister. The compressor crankcase has a lifetime supply of oil and the drive motor has permanently lubricated, sealed bearings. The evaporator and condenser fan motors also have permanently lubricated, sealed bearings. No lubrication of these items is required.

4-14. MECHANICAL LUBRICATION

The only mechanical items which may require lubrication are the louvers in the conditioned air intake and discharge grilles and the devices which operate the fresh air damper door. These points should be checked and lubricated, as necessary, during preventive maintenance service. A few drops of light oil should be applied to pivot points, bearing surfaces, and linkages to prevent or eliminate stiffness or binding. Be sure to wipe off all excess oil with a cloth or paper towel. These items are in areas of high volume air flow and excess oil will tend to attract and accumulate dust particles from the passing air. Graphite may be used as an alternate lubricant during extreme cold weather operation.

Section IV PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

4-15. INTRODUCTION, INSPECTION, AND SERVICE

a. Systematic, periodic, Preventive Maintenance Checks and Services (PMCS) are essential to ensure that the air conditioner is ready for operation at all times. The purpose of a preventive maintenance program is to discover and correct defects and deficiencies before they can cause serious damage or complete failure of the equipment. Any effective preventive maintenance program must begin with the indoctrination of operators to report all unusual conditions noted during daily checks or actual operation to organizational maintenance. All defects and deficiencies discovered during maintenance inspections must be recorded, together with corrective action taken, on DA Form 2404 (Equipment Inspection and Maintenance Worksheet).

b. A schedule for organizational preventive maintenance inspection and service should be established immediately after installation of the air conditioner. A quarterly interval, equal to three calendar months or 250 hours of operation (whichever occurs first) is recommended for usual operating conditions. When operating under unusual conditions, such as a very dusty or sandy environment, it may be necessary to reduce the interval to monthly or even less if conditions are extreme.

c. Table 4-1 lists the organizational preventive maintenance checks and services that should be performed at quarterly (or otherwise established) intervals. The PMCS items in the table have been arranged and numbered in a logical sequence to provide for greater personnel efficiency and least amount of required maintenance downtime.

WARNING

Disconnect input power before disassembly of the air conditioner for PMCS to prevent dangerous, possibly fatal, electrical shock.

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

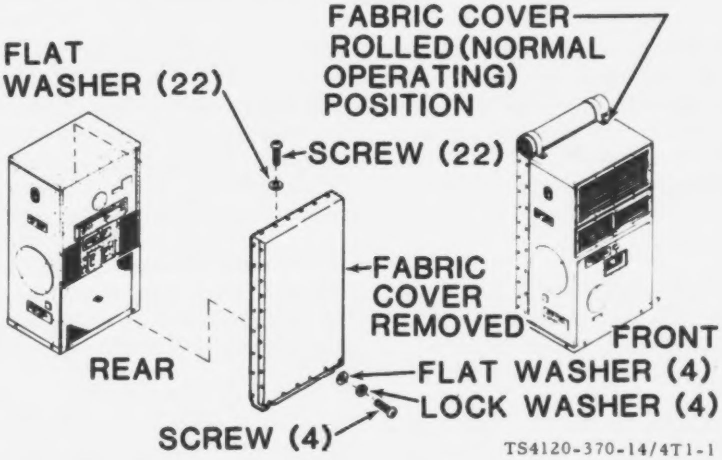
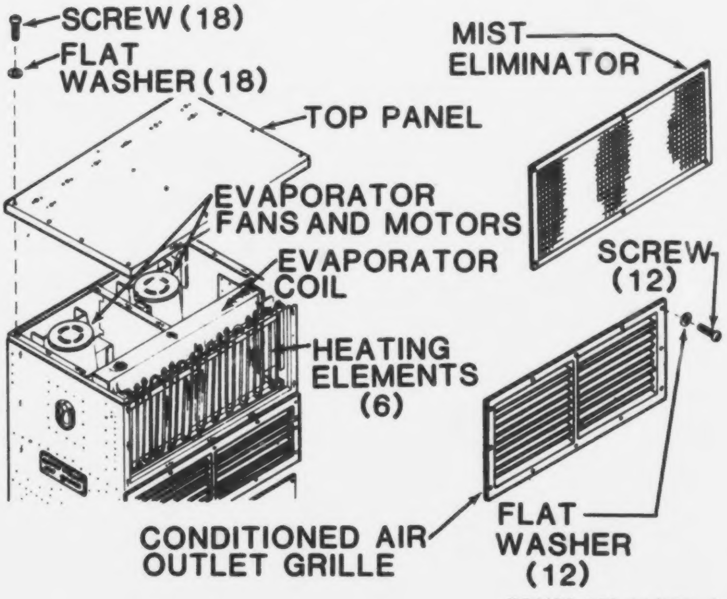
Item No.	Item To Be Inspected/Serviced	Procedures
1	Fabric Cover	 FABRIC COVER ROLLED (NORMAL OPERATING) POSITION FLAT WASHER (22) SCREW (22) FABRIC COVER REMOVED FRONT REAR FLAT WASHER (4) LOCK WASHER (4) SCREW (4) TS4120-370-14/4T1-1 a. Roll down the cover and inspect for tears, cracks, or any other sign of damage or deterioration. b. If the necessity of washing is indicated, use fresh water with a small amount of a mild detergent. c. Reroll and secure the cover in the stowed position. If the cover was washed, be sure it is thoroughly dry before rerolling. UPPER SECTION  SCREW (18) FLAT WASHER (18) MIST ELIMINATOR TOP PANEL EVAPORATOR FANS AND MOTORS EVAPORATOR COIL SCREW (12) HEATING ELEMENTS (6) CONDITIONED AIR OUTLET GRILLE FLAT WASHER (12) TS4120-370-14/4T1-2

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (cont.)

Item No.	Item To Be Inspected/Serviced	Procedures
2	Conditioned Air Outlet Grille	a. Check operation of louvers for stiffness or binding. b. Remove, clean, inspect, repair, and lubricate grille as necessary.
3	Mist Eliminator	a. Remove screws and flat washers, and remove fabric cover to gain access to top panel. b. Remove, clean, and inspect the top panel. c. Remove, clean, inspect, and service the mist eliminator. d. Replace the mist eliminator if it is damaged. **WARNING** Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm^2). Do not direct compressed air against the skin. Use goggles or full face shield.
4	Evaporator Coil	a. Blow accumulated dust and dirt out of the air passages in the evaporator coil using compressed air or the discharge side of a portable vacuum cleaner. Blow from front to back in the opposite direction from operational airflow. b. Inspect coil for obvious damage and all mounting hardware for tightness and security.
5	Heating Elements	a. Wipe or vacuum any remaining dust or dirt from the heating elements, the heater thermostat, and all other components and surfaces in the area. **NOTE** Use a clean, dry cloth (or one slightly moistened with water) for all wiping operations. NEVER use an oily or greasy cloth. Any oily residue left on any surface will attract and accumulate much more dust and dirt than dry surfaces. b. Inspect heating elements and thermostat for obvious damage, and all mounting hardware for tightness and security. c. Inspect wiring harness for damage or chafing and all electrical connections for tightness.

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (cont.)

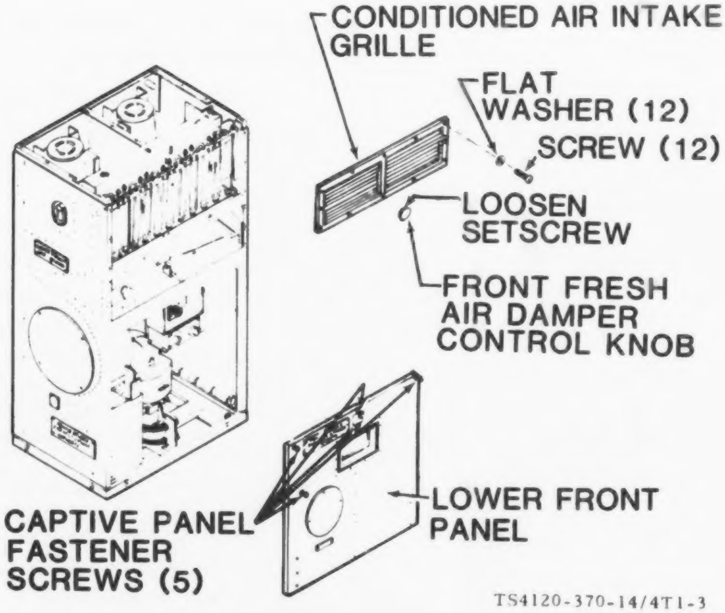
Item No.	Item To Be Inspected/Serviced	Procedures
6	Evaporator Fans and Motors	a. Wipe or vacuum all dust or dirt from the fans, motor, and all other components and surfaces in the area. b. Inspect the fans for damage or bent blades, the motor for signs of overheating, and all mounting hardware for tightness and security. c. Check that fans spin freely. d. Inspect wiring harness for damage or chafing and all electrical connections for tightness. e. Generally inspect refrigeration system components in the upper section for condition.
7	Conditioned Air Intake Grille	a. Check operation of louvers for stiffness or binding. b. Remove and place aside the front fresh air damper control knob. c. Remove, clean, repair, and lubricate grille as necessary.  CONDITIONED AIR INTAKE GRILLE FLAT WASHER (12) SCREW (12) LOOSEN SETSCREW FRONT FRESH AIR DAMPER CONTROL KNOB LOWER FRONT PANEL CAPTIVE PANEL FASTENER SCREWS (5) TS4120-370-14/4T1-3

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (cont.)

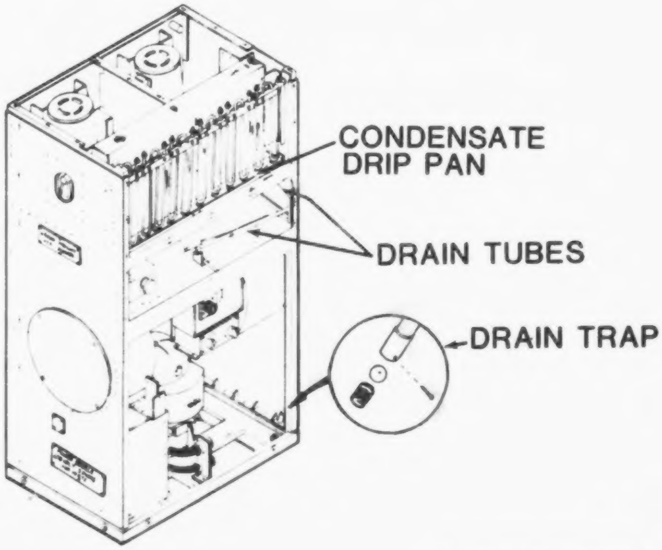
Item No.	Item To Be Inspected/Serviced	Procedures
8	Lower Front Panel	a. Be sure input power has been turned off, then disconnect the input power connector if the optional front panel input location has been used. b. Remove, clean, and inspect the front panel.
9	Condensate Drip Pan, Drain Tubes, and Drain Trap	 TS4120-370-14/4T1-4 a. Wipe any dust or dirt out of the condensate drip pan. b. Pour about one cup of clean fresh water into the condensate drip pan and watch for it to flow through the drain trap at the bottom end of the drain tube. c. If the water does not flow through the trap, or if the discharged water has a muddy appearance, remove the cotter pin, spring, and ball from the bottom end of the drain tube and thoroughly flush the tube. If the tube is clogged, insert a flexible wire from either the top or bottom end and agitate until the clog is removed. Pour additional water in the drip pan until an unrestricted flow of clean water is achieved. Check that ball and spring are clean and in good condition. Reinstall the ball, spring, and cotter pin.

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (cont.)

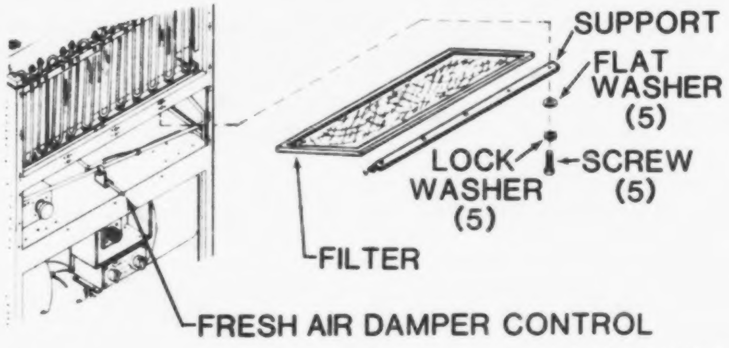
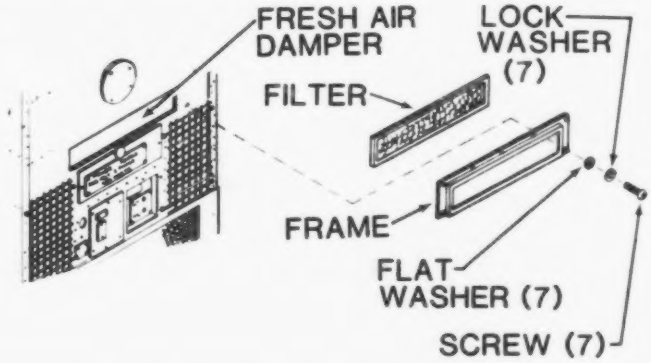
Item No.	Item To Be Inspected/Serviced	Procedures
10	Conditioned Air Filter	 SUPPORT FLAT WASHER (5) LOCK WASHER (5) SCREW (5) FILTER FRESH AIR DAMPER CONTROL TS4120-370-14/4T1-5 a. Remove, clean, inspect, and service filter. b. Discard filter and obtain replacement, if damaged.
11	Fresh Air Filter	 FRESH AIR DAMPER LOCK WASHER (7) FILTER FRAME FLAT WASHER (7) SCREW (7) TS4120-370-14/4T1-6 a. Remove, clean, inspect, and service filter. b. Discard filter and obtain replacement, if damaged.
12	Fresh Air Damper	a. Wipe or vacuum all dust or dirt from the fresh air damper door and its operating mechanism, and all other surfaces in the area. b. Inspect components for condition, and all mounting hardware for tightness and security. c. Check operation of door and mechanism for stiffness and binding; lubricate as necessary. Be sure to wipe off all excess lubricant. d. Check to be sure the damper door seats properly to form a seal when in the closed position.

Table 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (cont.)

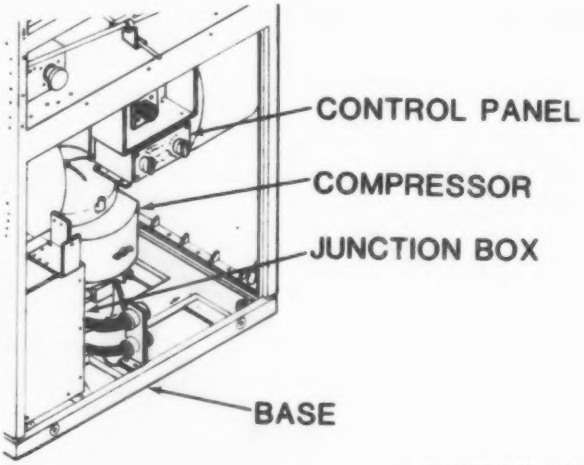
Item No.	Item To Be Inspected/Serviced	Procedures
		e. Inspect wiring harnesses which route through the area for damage or chafing.
		f. Generally inspect refrigeration system components for condition.
		LOWER SECTION  TS4120-370-14/4T1-7
13	Control Panel	a. Check operation of controls for stiffness or binding.
		b. Inspect wiring harness for damage or chafing, and all electrical connections for tightness.
		c. Check capillary to temperature sensing bulb for damage or kinking.
		d. Check all mounting hardware for tightness and security.
14	Compressor	a. Wipe or vacuum all dust or dirt from the compressor canister, and all other remaining components and surfaces in the lower section of the cabinet.
		b. Inspect the compressor crankcase heating elements and associated thermostats for condition.
		c. Inspect wiring harness for damage or chafing, and all electrical connections for tightness.
		d. Check all compressor mounting hardware for tightness and security.
		e. Check all remaining refrigeration system components in the lower section of the cabinet for general condition.

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (cont.)

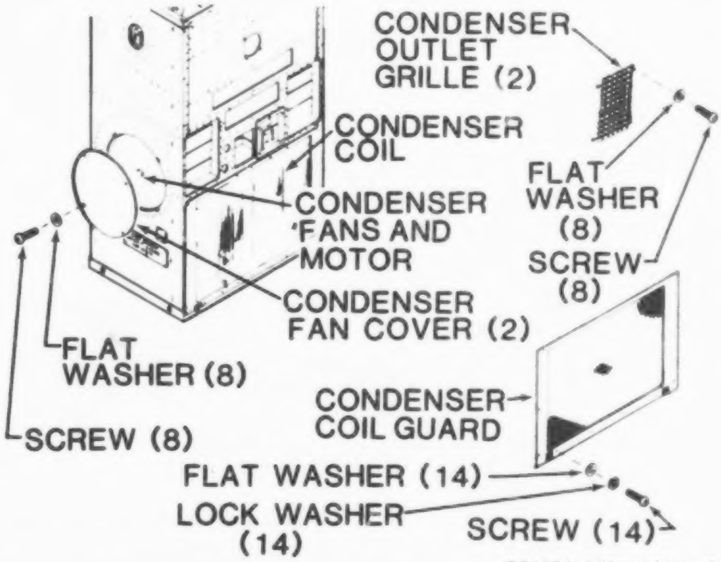
Item No.	Item To Be Inspected/Serviced	Procedures
15	Junction Box	a. Check operation of circuit breaker and flexible cable to remote reset knob for stiffness and binding. b. Inspect all remaining wiring harnesses in the lower section of the cabinet for damage or chafing, and all electrical connections for tightness.
16	Cabinet Base	a. Wipe or vacuum all dust, dirt, sand, or other foreign matter from surfaces and water passages in the base assembly. b. Check that water flows freely through the installed condensate drain(s).
17	Condenser Air Outlet Grilles	Remove, clean, and inspect.  CONDENSER OUTLET GRILLE (2) CONDENSER COIL FLAT WASHER (8) CONDENSER 'FANS AND MOTOR SCREW (8) CONDENSER FAN COVER (2) FLAT WASHER (8) CONDENSER COIL GUARD SCREW (8) FLAT WASHER (14) LOCK WASHER (14) SCREW (14) TS4120-370-14/4T1-8
18	Condenser Coil Guard	Remove, clean, and inspect. **WARNING** Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm^2). Do not direct compressed air against the skin. Use goggles or full face shield.
19	Condenser Coil	a. Blow dust and dirt from the condenser coil in the same manner as used for the evaporator coil in item 4. In this case, blow from the inside for reverse airflow direction. b. Inspect coil for obvious damage, and all mounting hardware for tightness and security.

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (cont.)

Item No.	Item To Be Inspected/Serviced	Procedures
20	Condenser Fans and Motor	a. Wipe or vacuum all dust and dirt from fans and motor, and all other components and surfaces in the immediate area. b. Inspect the fans for damage or bent blades, the motor for signs of overheating, and all mounting hardware for tightness and security. c. Inspect the wiring harness for damage or chafing, and all electrical connections for tightness. REINSTALL THE FOLLOWING ITEMS: • Condenser Coil Guard • Condenser Outlet Grilles • Fresh Air Filter and Frame • Conditioned Air Filter and Support • Lower Front Panel • Conditioned Air Intake Grille • Mist Eliminator • Top Panel • Conditioned Air Outlet Grille • Front Fresh Air Damper Knob • Fabric Cover Check to be sure that all items are back in place and secure.
21	Operation Checks	a. Be sure the mode selector switch is in the OFF position and reconnect input power. **NOTE** If power has just been connected to unit, a short (30 minute maximum during very cold weather) warm up period is required for COOL mode operation. When compressor reaches a safe operating temperature, it will come on automatically if the mode selector is in the COOL mode. b. Check that the fabric cover is rolled up and secured. c. Adjust conditioned air intake and outlet louvers to the full open position. d. Adjust fresh air damper to full closed position. e. Turn mode selector switch to VENTILATE. Fan should start. f. Use a paper streamer or smoke and note amount of air being discharged from conditioned air outlet grille. g. Open fresh air damper fully.

TABLE 4-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (cont.)

Item No.	Item To Be Inspected/Serviced	Procedures
		h. Close conditioned air intake grille louvers fully. i. Again check air flow as in step f. above. Air flow should be approximately the same. j. Fully open louvers in conditioned air intake grille and fully close fresh air damper. k. Turn TEMPerature control thermostat knob to fully INCREASE (clockwise) position and then turn mode selector switch to LO HEAT. Place your hand in air flow from the conditioned air outlet grille and feel for a temperature rise. When discharge air temperature has reached a relatively stable level, turn mode selector switch to HI HEAT and feel for a further temperature rise. Next, turn TEMPerature control thermostat knob to fully DECREASE (counterclockwise) position. Feel that discharge air temperature drops to approximately same relatively stable level previously noted in LO HEAT. Finally, turn mode selector switch to LO HEAT and feel discharge air temperature drop to ambient level. **NOTE** The TEMPerature control thermostat has an effective functional range between 40°F and 90°F (5°C and 32°C). In extreme conditions when ambient air temperature is below 40°F (5°C) or above 90°F (32°C), operation in either LO HEAT or HI HEAT mode will vary from that described above. l. Turn TEMPerature control thermostat knob to fully INCREASE (clockwise) position, then turn mode selector switch to COOL. Note that evaporator and condenser fans start immediately and that compressor starts approximately 30 seconds later. Hold your hand in air flow from conditioned air outlet grille; there should be no change in temperature. Now turn TEMPerature control thermostat knob to fully DECREASE (counterclockwise) position and feel outlet air temperature begin to drop almost immediately. Leave controls in present position and perform next check. m. After 15 minutes of operation, check the sight glass and compare refrigerant condition with the color coded information plate provided. (See para 2-3.) n. Turn mode selector switch to OFF and observe that all air conditioner functions cease. o. Set-up the air conditioner for the desired operational mode. p. Record performance of quarterly PMCS, including all corrective actions taken.

Section V TROUBLESHOOTING

4-16. GENERAL

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the air conditioner. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine corrective actions to take. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed, or is not corrected by listed corrective actions, notify your supervisor.

c. Table 4-2 lists the common malfunctions which you may find during the operation or maintenance of the air conditioner or its components. You should perform the tests/inspections and corrective actions in the order listed.

NOTE

Before you use this table, be sure you have performed all applicable operating checks.

WARNING

HIGH VOLTAGE

is used in the operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the input power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections of 208 volts ac input when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

Do not operate the equipment without all grilles, guards, louvers, and covers in place and tightly secured.

Warning: Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions.

TABLE 4-2. TROUBLESHOOTING

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

1. AIR CONDITIONER DOES NOT START IN ANY MODE.

Step 1. Check to see if input power has been disconnected.
Connect input power.
Step 2. Check to see if AC or DC CONTROL circuit breakers have tripped.
Reset circuit breaker.
Step 3. Check to see if compressor circuit breaker is tripped.
Slowly PULL out AND PUSH in reset knob TO RESET CIRCUIT BREAKER.
Step 4. Check for loose or damaged electrical connectors or damaged wires in wiring harnesses.
Tighten or replace connectors, or repair damaged wires.
Step 5. Check operation of the auxiliary switch in circuit breaker (CB1).
Test (CB1) auxiliary. (See para 4-48.) Replace circuit breaker if auxiliary switch is defective.
Step 6. Check operation of control power transformer (T).
Test transformer. (See para 4-50.)
Replace transformer, if defective.
Step 7. Check operation of RFI filter (FL 1, 2, 3, and 4) and d.c. rectifier (CR) assembly.
Test filters and rectifier. (See para 4-47.)
Replace defective filter(s) or rectifier.
Step 8. Check all terminals and internal wiring within junction box for tightness and damage.
Tighten terminals, or repair wiring as necessary. (See para 4-46.)
Step 9. Check operation of mode selector switch (S).
Test switch. (See para 4-39.)
Replace switch, if defective.

2. CONDITIONED AIR (EVAPORATOR) FAN STARTS IN COOL MODE, BUT CONDENSER FAN DOES NOT START AND COMPRESSOR DOES NOT START AFTER TIME DELAY.

NOTE

If power has just been connected to unit, a short (30 minute maximum during very cold weather) warm up period is required. When compressor reaches a safe operating temperature, it will come on automatically if mode selector switch is in the COOL mode.

Step 1. Check to see if high-or-low-pressure cutout switch (S5 and S6) is tripped.
Press, then release reset buttons.

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Step 2. Check for loose or damaged electrical connectors, or damaged wires in wiring harnesses.
Tighten or replace connectors, or repair damaged wires.

TABLE 4-2. TROUBLESHOOTING (cont.)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 3. Check operation of compressor motor thermal overload, overcurrent protector.
Test protector. Contact direct support maintenance for compressor replacement if protector is open.

Step 4. Check operation of mode selector switch (S).
Test switch. (See para 4-39.)
Replace switch if defective.

3. CONDITIONED AIR (EVAPORATOR) AND CONDENSER FANS BOTH RUN, BUT COMPRSSOR DOES NOT START AFTER TIME DELAY.

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Step 1. Check for loose or damaged electrical connectors, or damaged wires in wiring harnesses.
Tighten or replace connectors, or repair damaged wires.

Step 2. Check operation of time delay relay (K6).
Test relay. (See para 4-49.)
Replace relay if defective.

Step 3. Check operation of compressor motor relay (K9).
Test relay. (See para 4-55.)
Replace relay if defective.

Step 4. Check operation of circuit breaker (CB1) primary contacts.
Test circuit breaker. (See para 4-48.)
Replace circuit breaker if defective.

Step 5. Check operation of compressor (B1).
If not operating, contact direct support maintenance.

4. AIR CONDITIONER STOPS COMPLETELY DURING COOL MODE OPERATION.

Step 1. Check to see if circuit breakers (CB1, 2, or 3) are tripped.
Reset circuit breaker(s).

Step 2. Check to be sure condenser fan starts immediately when a restart in COOL mode is made. If condenser fan does not start, test as follows:

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

a. Test condenser fan motor relay (K7). (See para 4-53.) Replace if defective.
b. Test condenser fan motor (B2). (See para 4-63.) Contact direct support maintenance if motor is defective.

Step 3. Check to be sure there is no restriction to air flow through condenser section.
Clean all obstructions from condenser inlet, outlets, and condenser coil.

CAUTION

If circuit breaker trips again soon after restart in COOL mode, do not attempt another restart, and contact direct support maintenance for refrigeration system troubleshooting.

best copy available

TABLE 4-2. TROUBLESHOOTING (cont.)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

5. COMPRESSOR AND CONDENSER FAN STOP DURING COOL MODE OPERATION, BUT CONDITIONED AIR (EVAPORATOR) FAN CONTINUES TO RUN.

Step 1. Check to see if high-or-low-pressure cutout switch (S5 or S6) is tripped.

Press, then release tripped reset button.

CAUTION

Wait at least two minutes before restarting in COOL mode. If either pressure cutout switch trips soon after a restart is made, do not attempt another restart, and contact direct support maintenance for refrigeration system troubleshooting.

6. CONDITIONED AIR (EVAPORATOR) FAN DOES NOT START, OR STOPS DURING OPERATION, IN ANY OPERATING MODE.

Step 1. Check operation of conditioned air (evaporator) fan motor relay (K8).

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Test relay. (See para 4-54). Replace relay if defective.

Step 2. Check operation of conditioned air (evaporator) fan motors (B3 and B4).

Test motors. (See para 4-59.) Contact direct support maintenance if motors are defective.

Step 3. Check operation of mode selector switch (S).

Test switch. (See para 4-39.) Replace switch if defective.

7. EXCESSIVE NOISE WHEN COMPRESSOR STARTS.

CAUTION

If a knocking or hammering sound is heard when compressor starts, turn mode selector switch to OFF, immediately. Such noise is usually caused by liquid refrigerant in compressor, which can seriously damage or destroy compressor. Contact direct support maintenance.

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Step 1. Check for a defective compressor.

(Contact direct support maintenance.)

8. EXCESSIVELY NOISY OPERATION.

Step 1. Isolate source of noise as near as possible, both by ear and touch.

Listen and feel at both front and back of cabinet.

Step 2. Check fans for looseness or damage, and for rotational clearance.

Tighten loose fans, adjust for rotational clearance, or replace if damaged.

Step 3. Check all internal components for looseness, vibration, and security.

Tighten, adjust, and secure as necessary.

TABLE 4-2. TROUBLESHOOTING (cont.)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

9. NO HEAT IN EITHER HI HEAT OR LO HEAT MODE.

Step 1. Check for loose or damaged electrical connectors, or damaged wires in wiring harnesses.

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Tighten or replace loose or damaged connectors, or repair damaged wires.

Step 2. Check operation of heater thermostat (S3).

Test thermostat. (See para 4-60.) Replace thermostat if defective.

Step 3. Check operation of mode selector switch (S).

Test switch. (See para 4-39.) Replace switch if defective.

10. HEAT IN HI HEAT MODE, BUT NOT IN LO HEAT MODE.

Step 1. Check for loose or damaged electrical connectors, or damaged wires in wiring harnesses.

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Tighten or replace loose or damaged connectors, or repair damaged wires.

Step 2. Check operation of heater relay (K1).

Test relay. (See para 4-52.) Replace relay if defective.

Step 3. Check operation of TEMPerature control thermostat (S1).

a. Inspect sensing bulb and capillary for damage or leakage. Replace entire control if bulb is damaged or leaking.
b. Test switch in TEMPerature control thermostat. (See para 4-38.) Replace entire control if defective.

Step 4. Check operation of mode selector switch (S).

Test switch. (See para 4-39.) Replace switch if defective.

11. REDUCED HEATING CAPACITY.

Step 1. Check airflow out of conditioned air (evaporator) discharge grille. If air flow volume is low:

a. Adjust conditioned air (evaporator) intake grille louvers.
b. Clean and service, or replace, conditioned air filter element. (See para 4-31.)
c. Clean and service, or replace, mist eliminator. (See para 4-32.)
d. Clean evaporator coil, and entire evaporator section. (See para 4-67.)

Step 2. Check adjustment of fresh air damper and/or CBR filter, if installed.

Adjust properly.

Step 3. Check operation of heater thermostat (S3).

WARNING

Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.

Test thermostat. (See para 4-60.) Replace thermostat if defective.

TABLE 4-2. TROUBLESHOOTING (cont.)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 4. Check operation of individual heater elements (HR1, 2, 3, 4, 5, and 6).

Test each element. (See para 4-61.) Replace defective elements.

Step 5. Check operation of TEMPerature control thermostat (S1).

a. Inspect sensing bulb and capillary for damage or leakage. Replace entire control if bulb is damaged or leaking.

b. Test TEMPerature control thermostat. (See para 4-38.) Replace entire control if defective.

12. REDUCED COOLING CAPACITY.

Step 1. Check condition of refrigerant displayed in sight glass.

a. If indicator (bull's eye) color is yellow or a light hue of chartreuse, or if numerous bubbles appear, turn air conditioner OFF, and contact direct support maintenance for refrigeration system servicing.

b. If indicator (bull's eye) color is green or a dark hue of chartreuse, or if refrigerant has a milky appearance, or more than an occasional bubble appears, thoroughly clean the condenser intake screen, condenser fan guard, condenser coil, and entire condenser section to remove all obstructions.

Step 2. Check air flow out of conditioned air (evaporator) discharge grille. If air flow volume is low:

a. Adjust conditioned air (evaporator) intake grille louvers.

b. Clean and service, or replace conditioned air filter element. (See para 4-31.)

c. Clean and service, or replace, mist eliminator. (See para 4-32.)

d. Clean evaporator coil and entire evaporator system. (See para 4-67.)

Step 3. Check adjustment of fresh air damper and/or CBR filter if installed.

Adjust properly.

Step 4. Check operation of TEMPerature control thermostat (S1).

a. Inspect sensing bulb and capillary for damage or leakage. Replace entire control if bulb is damaged or leaking.

b. Test TEMPerature control thermostat. (See para 4-38.) Replace entire control, if defective.

Step 5. Contact direct support maintenance for refrigeration system troubleshooting.

Section VI MAINTENANCE PROCEDURES

4-17. GENERAL

The procedures in this section have been arranged in the order in which the items appear in the organizational (O) maintenance level column on the Maintenance Allocation Chart (MAC) which is provided in Appendix B. Step-by-step procedures have been provided for all actions authorized to be performed by organizational maintenance in the order in which they appear on the MAC. Actions authorized to be performed by direct and general support maintenance have been noted; step-by-step procedures for these actions may be found in Chapters 5 and 6 respectively.

WARNING

> The panels, covers, screens, grilles, and guards installed on this unit are there for a purpose.
>
> Do not operate this unit with them off or open unless the instructions tell you to. When this is necessary, do so with care.

4-18. FABRIC COVER

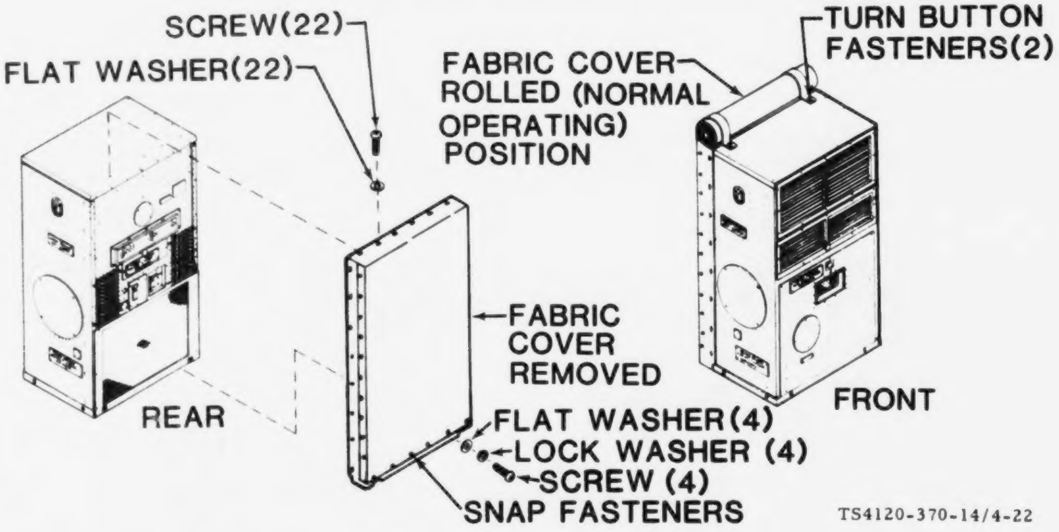

SCREW(22)
FLAT WASHER(22)
FABRIC COVER ROLLED (NORMAL OPERATING) POSITION
TURN BUTTON FASTENERS(2)
FABRIC COVER REMOVED
REAR
FRONT
FLAT WASHER(4)
LOCK WASHER (4)
SCREW (4)
SNAP FASTENERS
TS4120-370-14/4-22

Figure 4-22. Fabric Cover

a. Removal

(1) Roll cover down and secure snap fasteners.

(2) Using screwdriver, remove twenty-six screws and flat washers, and four lock washers.

(3) Carefully remove the fabric cover.

b. Cleaning

(1) Wipe clean with rag and mild detergent solution.

(2) Thoroughly rinse with fresh water and dry.

c. Lubrication

(1) Snaps may be lubricated with silicone type lubricant or a wax stick.

(2) Turnbutton fasteners may be lubricated with silicone type lubricant or light oil.

d. Inspection/Repair

(1) Inspect for rips, cuts, tears, or punctures in the fabric.

(2) Inspect for damaged, loose, or missing eyelets and snap fasteners.

(3) Refer repair/replacement to direct support maintenance.

e. Installation

(1) Aline eyelets to casing mounting holes.

(2) Using screwdriver, secure fabric cover with twenty-six screws and flat washers and four lock washers.

(3) If the air conditioner is to be returned to normal operation, open the snap fasteners, roll up the back flap, and secure it with the stowing straps and turnbutton fasteners.

NOTE

If the air conditioner installation requires removal of cover, reinstall the mounting screws and washers. This will protect the threads in the casing and prevent air leaks.

4-19. CBR (CHEMICAL, BIOLOGICAL, RADIOLOGICAL) COVER

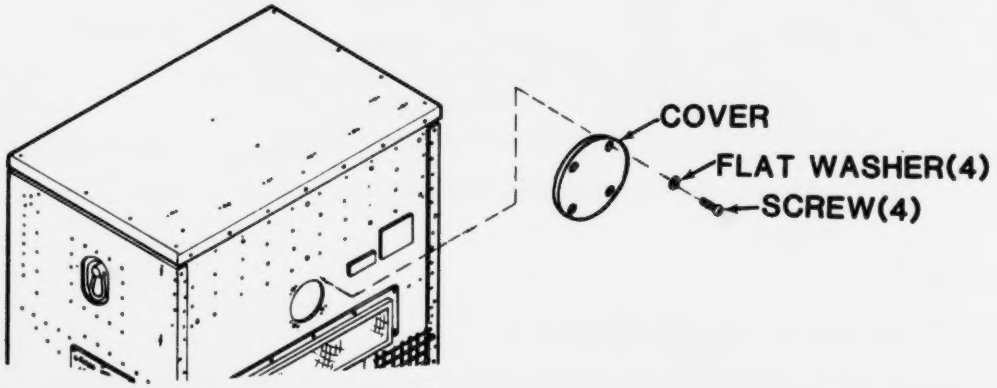


Figure 4-23. CBR Cover

TS4120-370-14/4-23

a. Removal

(1) Using screwdriver, remove four screws and flat washers.

(2) Remove cover.

b. Inspection

(1) Check that cover is not bent, cracked, or punctured. If damaged refer to direct support maintenance.

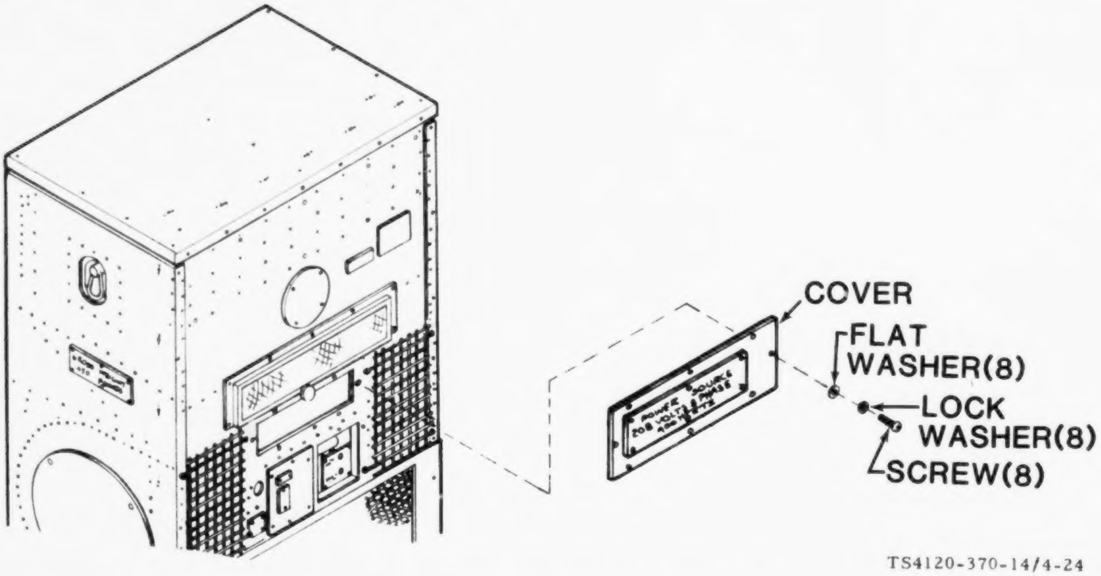
(2) Check that insulation is not torn, loose, or missing. Refer repair/replacement to direct support maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure cover to casing with four screws and flat washers.

4-20. ACTUATING CYLINDER ACCESS COVER



TS4120-370-14/4-24

Figure 4-24. Actuating Cylinder Access Cover

a. Removal

(1) Using screwdriver, remove eight screws, lock washers, and flat washers.

(2) Remove cover.

b. Inspection

(1) Check that cover is not bent, cracked, or punctured.

(2) Check that gasket is not torn, loose, or missing.

(3) Check that POWER SOURCE plate is readable and in place.

(4) Refer all repairs/replacement to direct support maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure cover to casing with eight screws, lock washers, and flat washers.

4-21. SERVICE VALVE COVER

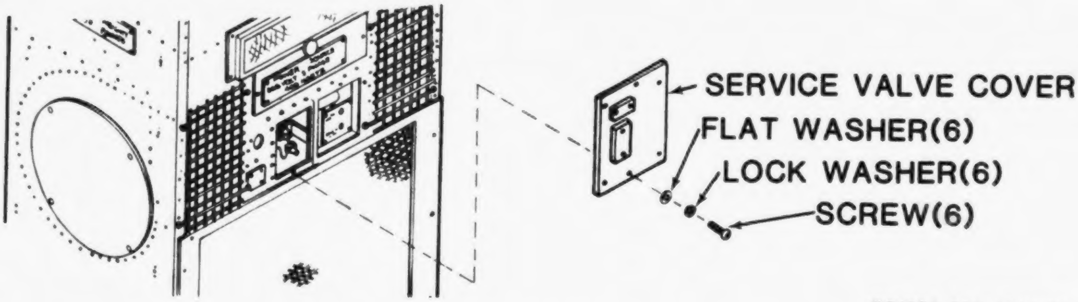


Figure 4-25. Service Valve Cover

a. Removal

(1) Using screwdriver, remove six screws, lock washers, and flat washers.

(2) Remove cover.

b. Inspection

(1) Check that cover is not bent, cracked, or punctured.

(2) Check that gasket is not torn, loose, or missing.

(3) Check that information plates are readable and in place.

(4) Refer all repairs/replacement to direct support maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure cover to casing with six screws, lock washers, and flat washers.

4-22. CONDENSER FAN COVERS

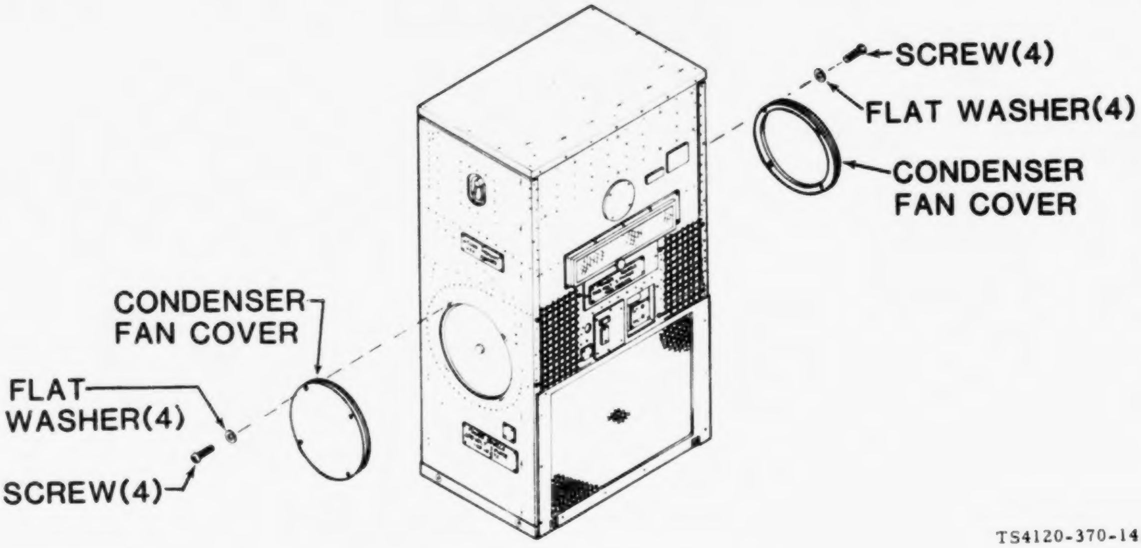

SCREW(4)
FLAT WASHER(4)
CONDENSER FAN COVER
CONDENSER FAN COVER
FLAT WASHER(4)
SCREW(4)
TS4120-370-14/4-26

Figure 4-26. Condenser Fan Covers

a. Removal

(1) Using screwdriver, remove four screws and flat washers.

(2) Remove cover(s).

b. Inspection

(1) Check that cover(s) are not bent, cracked, or punctured. If damaged refer to direct support maintenance.

(2) Check that gasket(s) are not torn, loose, or missing. Refer repair/replacement to direct support maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure cover(s) to casing with four screws and flat washers.

4-23. CONNECTOR COVER PLATES

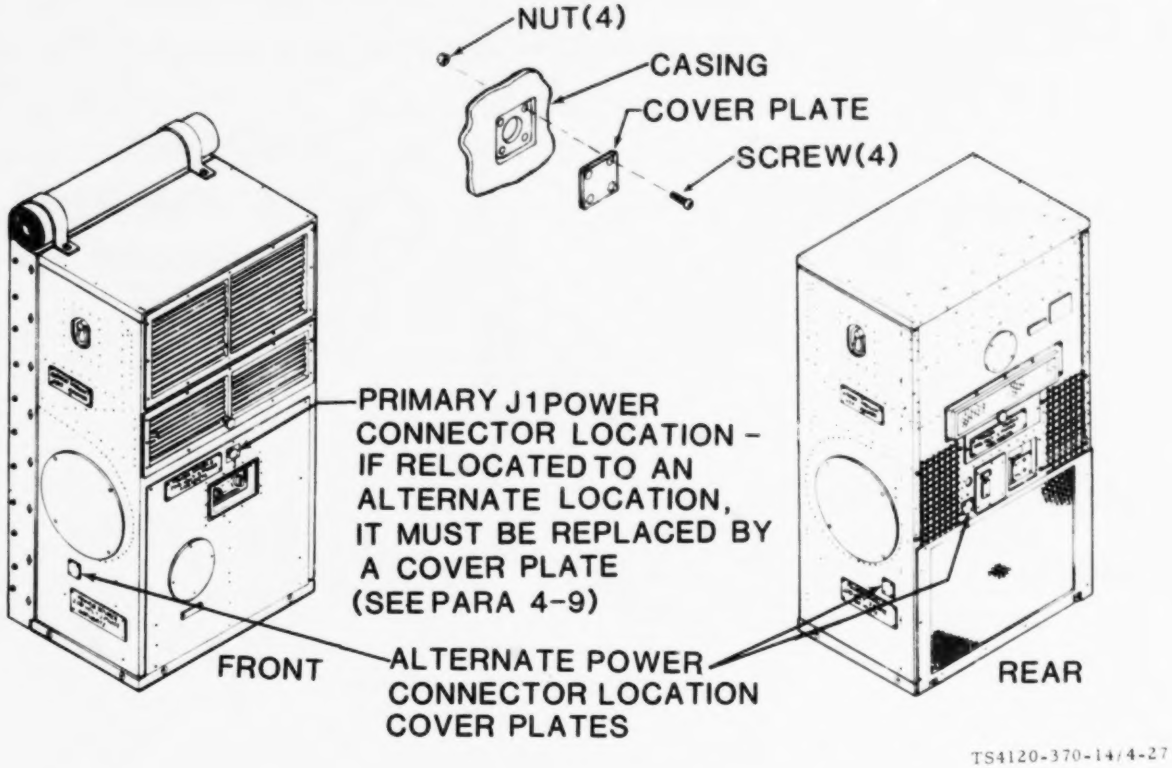

NUT(4)
CASING
COVER PLATE
SCREW(4)
PRIMARY J1 POWER CONNECTOR LOCATION - IF RELOCATED TO AN ALTERNATE LOCATION, IT MUST BE REPLACED BY A COVER PLATE (SEE PARA 4-9)
FRONT
ALTERNATE POWER CONNECTOR LOCATION COVER PLATES
REAR
TS4120-370-14/4-27

Figure 4-27. Connector Cover Plate

There are three connector cover plates on the air conditioner. See installation instructions (para 4-9) for access and additional information.

a. Removal

(1) Using screwdriver and wrench, remove four screws and nuts.

(2) Remove cover plate.

b. Inspection. Check that cover is not bent, cracked, or punctured. If damaged, refer to direct support maintenance.

c. Installation

(1) Aline mounting holes.

(2) Using screwdriver and wrench, install cover plate with four screws and nuts.

4-24. TOP PANEL

WARNING

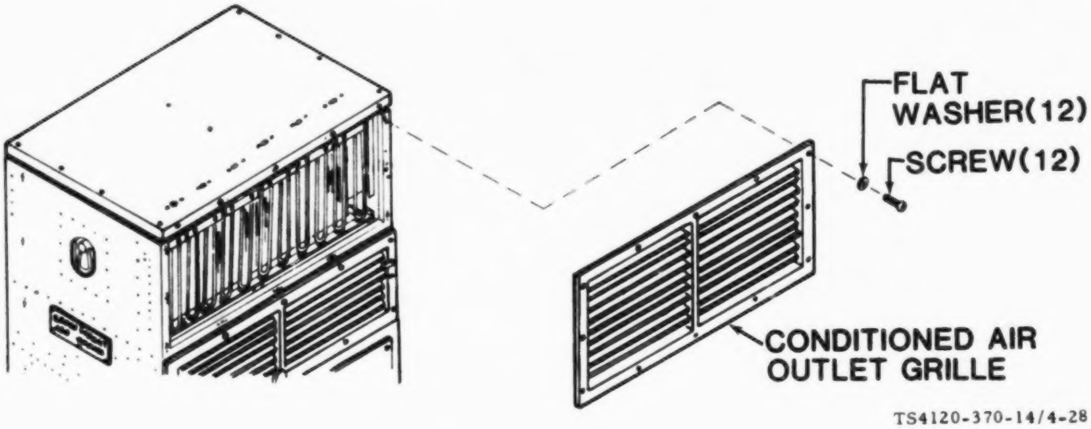
Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

Preliminary procedure: Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

a. Removal

(1) Using screwdriver, remove twelve screws and flat washers from conditioned air outlet grille.

(2) Remove grille.



TS4120-370-14/4-28

Figure 4-28. Conditioned Air Outlet Grille

(3) Using screwdriver, remove screws and flat washers across top and down both sides of fabric cover enough to gain access to top panel.

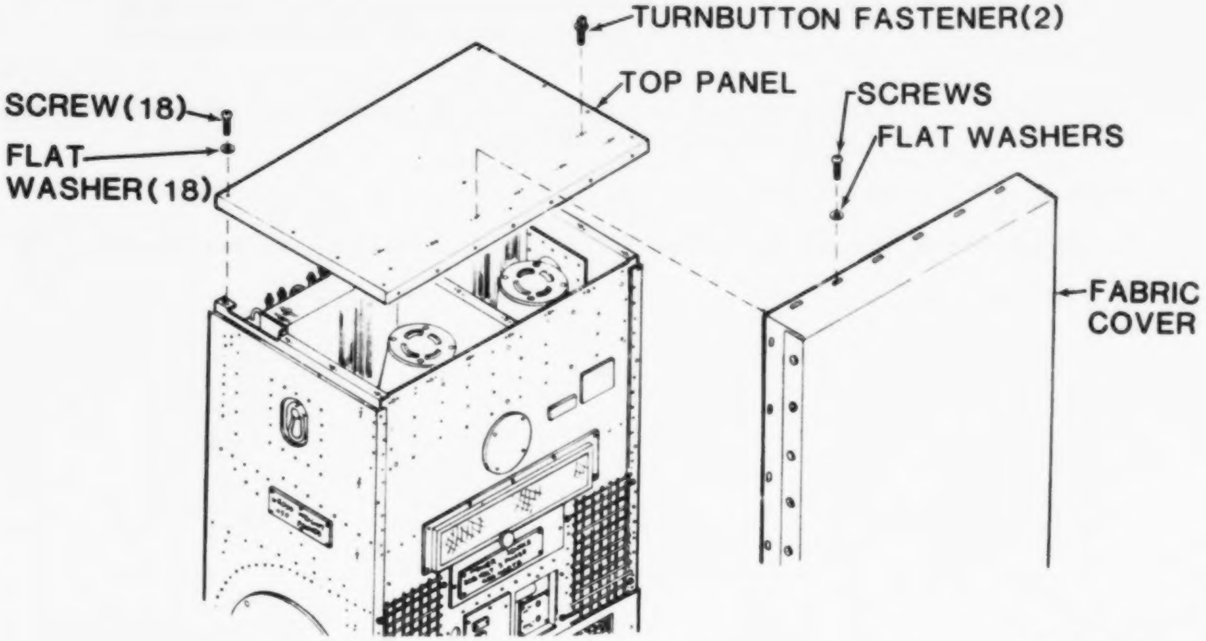

TURNBUTTON FASTENER(2)
TOP PANEL
SCREW(18)
FLAT WASHER(18)
SCREWS
FLAT WASHERS
FABRIC COVER
TS4120-370-14/4-29

Figure 4-29. Top Panel

(4) Using screwdriver, remove eighteen screws and flat washers.

(5) Remove top panel.

b. Inspection

(1) Check that panel is not bent, cracked, or punctured.

(2) Check that turnbutton fasteners are in place and in good condition. Replace if missing or damaged.

(3) Check that gaskets and insulation are not torn, loose, or missing.

(4) Refer repair/replacement of panel, gaskets, and insulation to direct support maintenance.

c. Installation

(1) Using screwdriver, secure top panel to casing with eighteen screws and flat washers.

(2) Using screwdriver, secure fabric cover to case and top panel with screws and flat washers removed in step a(3).

(3) Using screwdriver, secure conditioned air outlet grille with twelve screws and flat washers.

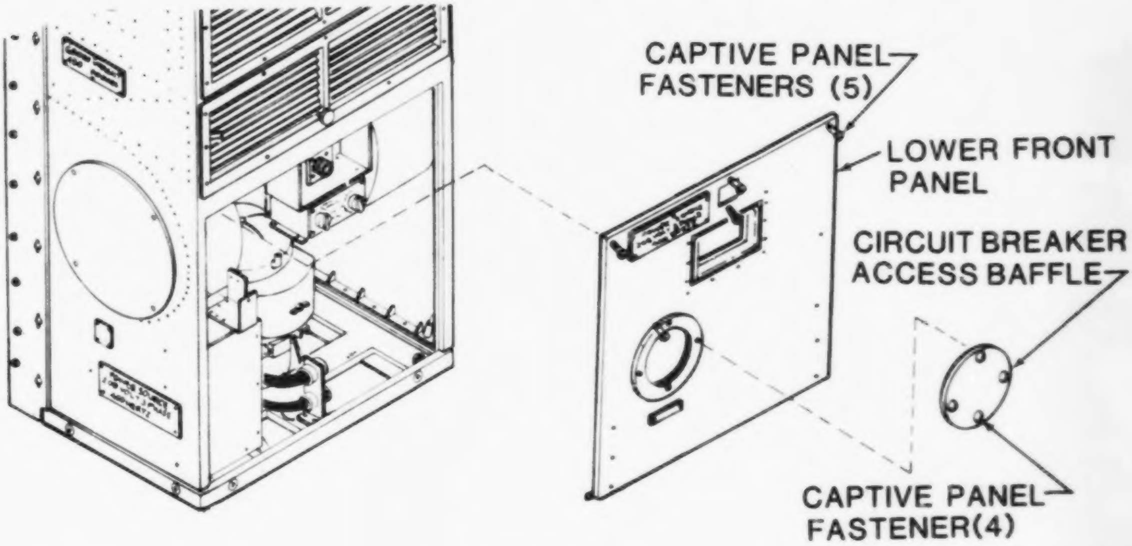
Follow-on procedure: Connect power.

4-25. LOWER FRONT PANEL AND CIRCUIT BREAKER ACCESS BAFFLE

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

Preliminary procedure: Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.


CAPTIVE PANEL FASTENERS (5)
LOWER FRONT PANEL
CIRCUIT BREAKER ACCESS BAFFLE
CAPTIVE PANEL FASTENER(4)

TS4120-370-14/4-30

Figure 4-30. Lower Front Panel and Circuit Breaker Access Baffle

a. Removal

(1) Using screwdriver, loosen four captive panel fasteners and remove circuit breaker access baffle.

(2) Using screwdriver, loosen five captive panel fasteners in lower front panel.

(3) Tilt top of lower front panel out and lift panel up to remove.

b. Inspection

(1) Check that panel and baffle are not bent, cracked, or punctured.

(2) Check that gasket and insulation are not torn, loose, or missing.

(3) Check that information plates are readable and in place.

(4) Refer all repairs/replacement to direct support maintenance.

c. Installation

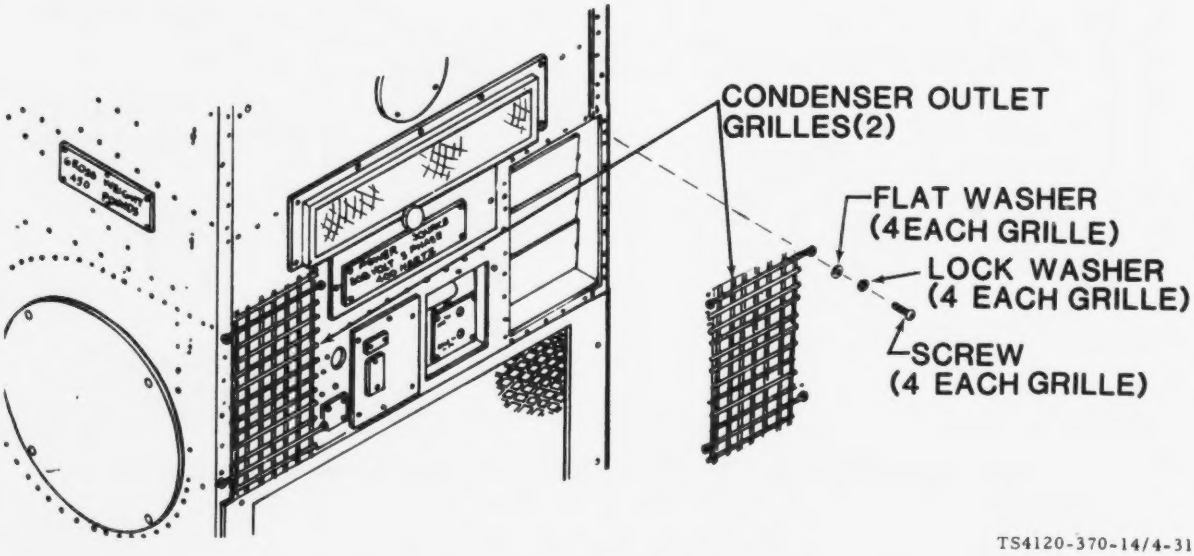
(1) Set the bottom of the panel in position so that the flange is inside the lip on the cabinet base.

(2) Push the top of the panel back into position.

(3) Using screwdriver, secure panel to casing and baffle to panel.

Follow-on procedure: Connect power.

4-26. CONDENSER OUTLET GRILLES


CONDENSER OUTLET GRILLES(2)
FLAT WASHER (4EACH GRILLE)
LOCK WASHER (4 EACH GRILLE)
SCREW (4 EACH GRILLE)

TS4120-370-14/4-31

Figure 4-31. Condenser Outlet Grilles

a. Removal

(1) Using screwdriver, remove four screws, lock washers, and flat washers from each grille.

(2) Remove grille(s).

b. Inspection. Check that grille is not bent or broken. If damaged, refer to direct support maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure grille(s) to casing with four screws, lock washers, and flat washers.

4-27. CONDENSER COIL GUARD

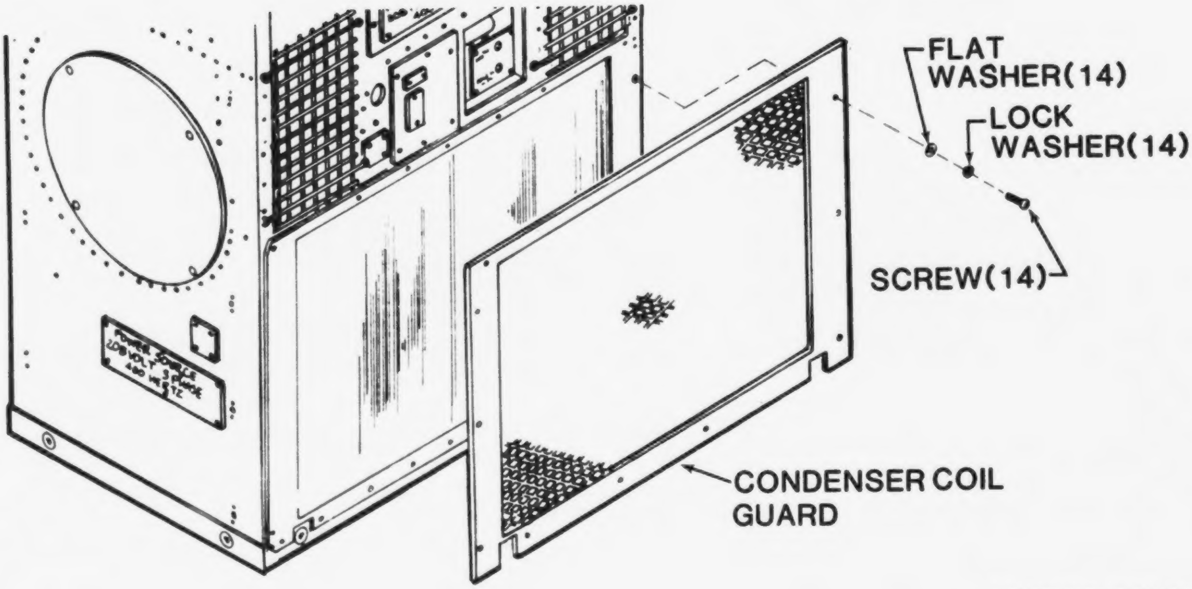

FLAT WASHER(14)
LOCK WASHER(14)
SCREW(14)
CONDENSER COIL GUARD
POWER SOURCE 208 VOLT 3 PHASE 400 HERTZ
TS4120-370-14/4-32

Figure 4-32. Condenser Coil Guard

a. Removal

(1) Using screwdriver, remove fourteen screws, lock washers, and flat washers.

(2) Remove guard.

b. Inspection. Check that guard is not bent, cracked, or otherwise damaged. Refer repairs to direct support maintenance.

c. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure guard to casing with fourteen screws, lock washers, and flat washers.

4-28. CONDITIONED AIR OUTLET GRILLE

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

Preliminary procedure: Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

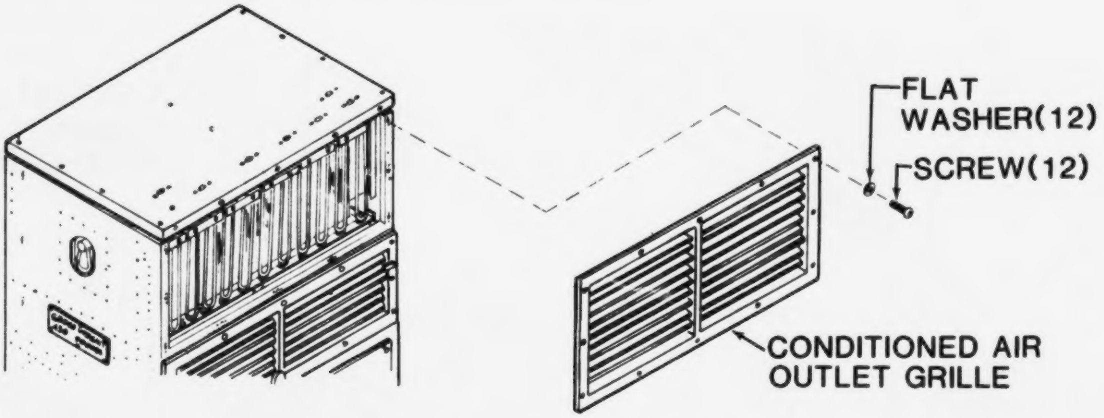


Figure 4-33. Conditioned Air Outlet Grille

TS4120-370-14/4-33

a. Removal

(1) Using screwdriver, remove twelve screws and flat washers.

(2) Remove grille.

b. Cleaning. Wipe or vacuum all dust and dirt off louvers and inside of grille. Be careful not to damage gasket strips.

c. Inspection/Repair

(1) Inspect grille for general condition and proper operation.

(2) Bent louvers can usually be straightened with fingers.

(3) Refer requirements for further repairs to direct support maintenance.

d. Lubrication

(1) Apply a few drops of light oil to all pivot points and bearing surfaces of the louvers.

(2) Wipe or blot up all excess oil with a cloth or paper towel.

e. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure grille with twelve screws and flat washers.

Follow-on procedure: Connect power.

4-29. CONDITIONED AIR INTAKE GRILLE

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

Preliminary procedure: Turn power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

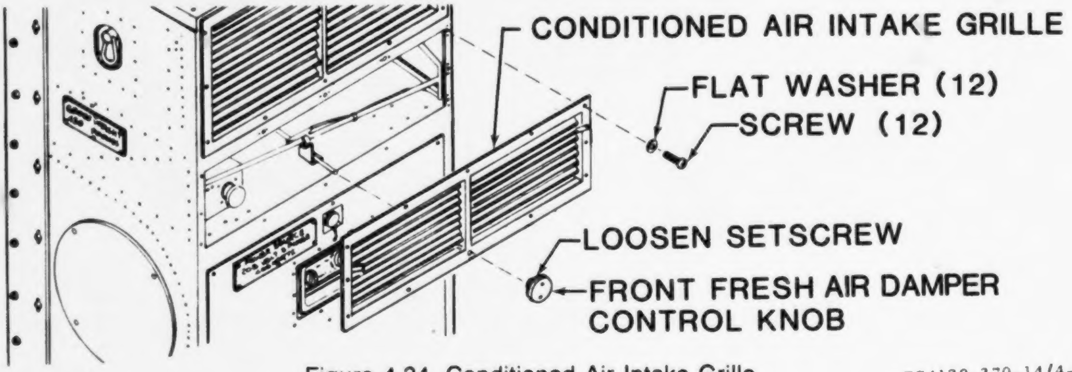

CONDITIONED AIR INTAKE GRILLE
FLAT WASHER (12)
SCREW (12)
LOOSEN SETSCREW
FRONT FRESH AIR DAMPER CONTROL KNOB

Figure 4-34. Conditioned Air Intake Grille TS4120-370-14/4-34

a. Removal

(1) Using allen wrench, loosen setscrew and remove front fresh air damper control knob.

(2) Using screwdriver, remove twelve screws and flat washers.

(3) Remove grille.

b. Cleaning. Wipe or vacuum all dust and dirt off louvers and inside of grille. Be careful not to damage gasket strips.

c. Inspection/Repair

(1) Inspect grille for general condition and proper operation.

(2) Bent louvers can usually be straightened with fingers.

(3) Refer requirements for further repairs to direct support maintenance.

d. Lubrication

(1) Apply a few drops of light oil to all pivot points and bearing surfaces of the louvers.

(2) Wipe or blot up all excess oil with a cloth or paper towel.

e. Installation

(1) Aline mounting holes with casing fasteners.

(2) Using screwdriver, secure grille with twelve screws and flat washers.

(3) Place front fresh air damper control knob on damper shaft and tighten setscrew with allen wrench.

Follow-on Procedure: Connect power.

4-30. FRESH AIR FILTER

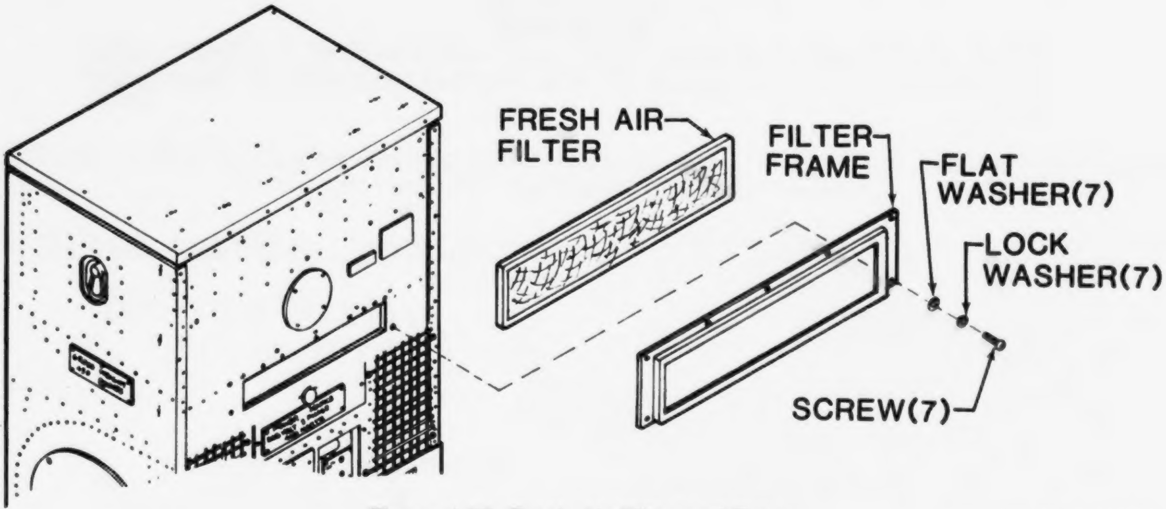


Figure 4-35. Fresh Air Filter and Frame

TS4120-370-14/4-35

a. Removal

(1) Using screwdriver, remove seven screws, lock washers, and flat washers.

(2) Remove filter and frame from unit.

(3) Slip filter out of frame.

b. Clean filter

(1) Wash filter in a mild detergent and water solution.

(2) Rinse thoroughly in clear water.

(3) Shake out excess water prior to installation.

c. Inspection

(1) Check filter for punctures, cuts, and damaged edges that would allow passage of unfiltered air.

(2) Check filter for packed or mashed areas that would block air flow.

(3) Replace filter if found bad.

d. Servicing (after washing filter)

(1) Apply coater (item 1, Appendix E) to filter media.

(2) Wipe excess coater from filter.

e. Installation

(1) Place filter in filter frame with directional arrow pointing toward air conditioner.

(2) Using screwdriver, secure filter and frame to unit with seven screws, lock washers, and flat washers.

4-31. CONDITIONED AIR FILTER

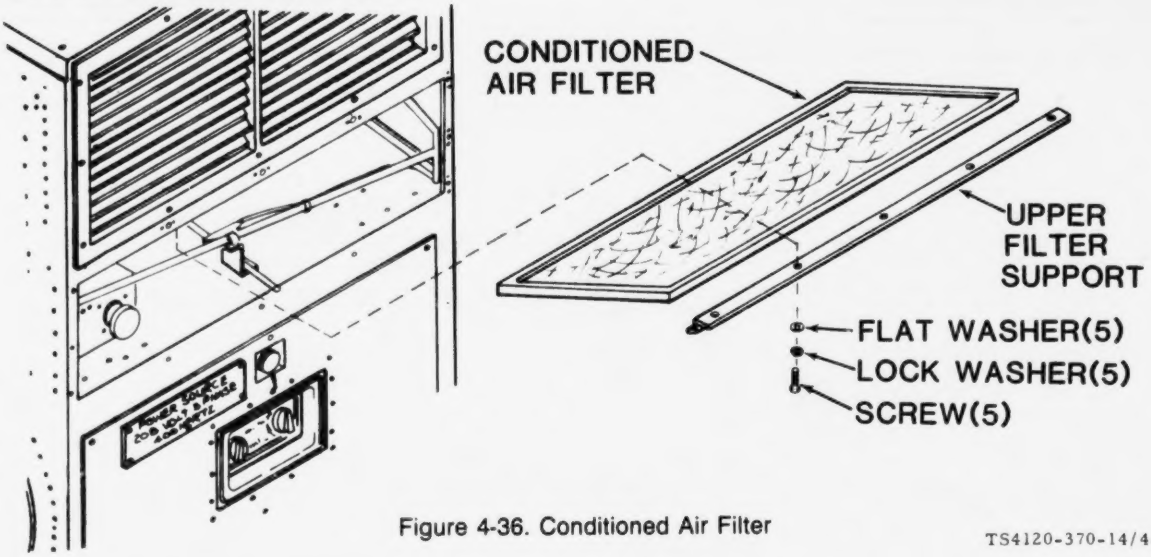

CONDITIONED AIR FILTER
UPPER FILTER SUPPORT
FLAT WASHER(5)
LOCK WASHER(5)
SCREW(5)
POWER SOURCE 208 VOLT 3 PHASE 400 HERTZ

Figure 4-36. Conditioned Air Filter

TS4120-370-14/4-36

Preliminary procedure: Remove conditioned air intake grille. (See para 4-29.)

a. Removal

(1) Using screwdriver, remove five screws, lock washers, and flat washers.

(2) Remove upper filter support and filter.

b. Clean filter

(1) Wash filter in a mild detergent and water solution.

(2) Rinse thoroughly in clear water.

(3) Shake out excess water prior to installation.

c. Inspection

(1) Check filter for punctures, cuts, and damaged edges that would allow passage of unfiltered air.

(2) Check filter for packed or mashed areas that would block air flow.

(3) Replace filter if found bad.

d. Servicing (after washing filter)

(1) Apply coater (item 1, Appendix E) to the filter media.

(2) Wipe excess coater from filter.

e. Installation

(1) Place filter in lower filter support (part of casing). Be sure that directional arrow is pointing up.

(2) Using screwdriver, secure upper filter support to casing with five screws, lock washers, and flat washers.

Follow-on procedure: Install conditioned air intake grille. (See para 4-29.)

4-32. MIST ELIMINATOR

Preliminary procedure: Remove top panel. (See para 4-24.)

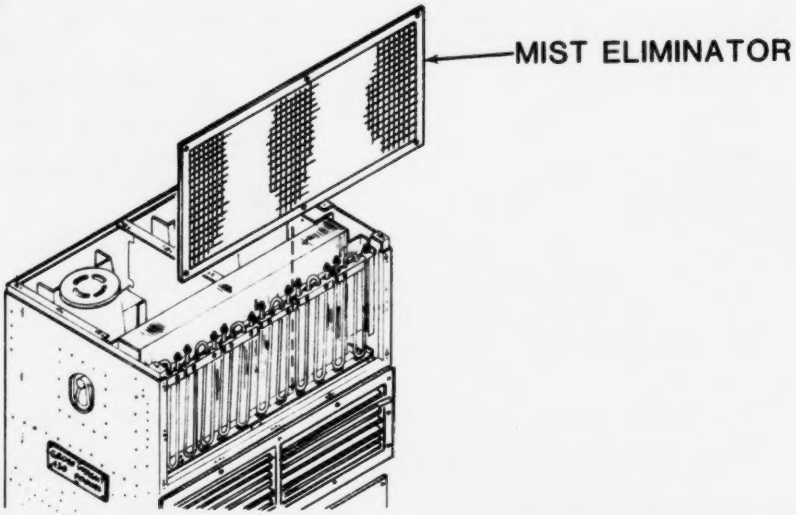


Figure 4-37. Mist Eliminator

TS4120-370-14/4-37

a. Removal. Lift mist eliminator straight up and out of guides.

b. Cleaning

(1) Wash in mild detergent and water solution.

(2) Rinse thoroughly in clear water.

(3) Shake out excess water prior to installation.

c. Inspection

(1) Check for punctures, cuts, and other visible damage.

(2) Check for packed or mashed areas that would block air flow.

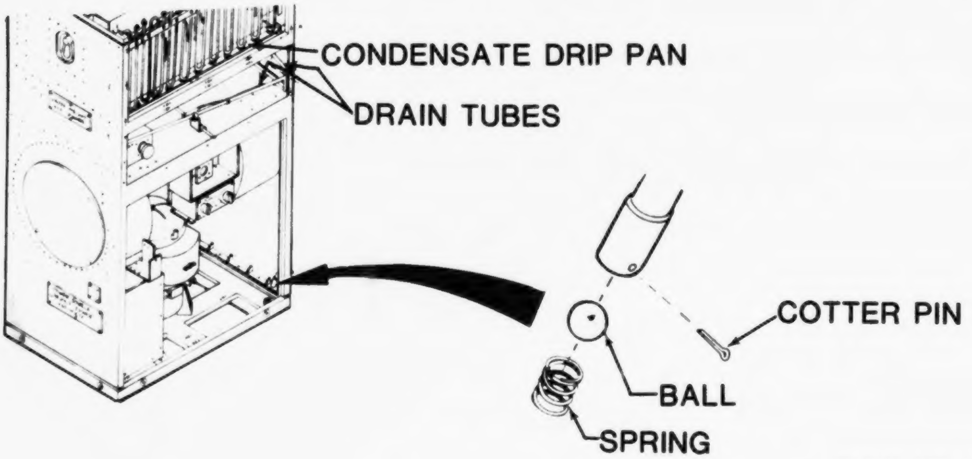
(3) Replace if found bad.

d. Installation. Slide mist eliminator straight down into guides.

Follow-on procedure: Install top panel. (See para 4-24.)

4-33. CONDENSATE TRAP

Preliminary procedure: Remove lower front panel. (See para 4-25.)



TS4120-370-14/4-38

Figure 4-38. Condensate (Drain) Trap

a. Removal

(1) Using pliers remove cotter pin.

(2) Remove spring and ball.

b. Inspection

(1) Check ball, spring, and cotter pin for nicks and wear.

(2) Replace ball if it is nicked or has any damage that would keep it from sealing properly.

(3) Replace spring if it is worn or has any damage that would keep it from applying pressure to ball.

c. Cleaning

Preliminary procedures: 1. Remove top panel. (See para 4-24.)

2. Remove mist eliminator. (See para 4-32.)

(1) Pour some clean fresh water into condensate drip pan.

(2) If water does not flow out of the end of the drain tube or has a muddy appearance, insert a flexible wire up the drain tube. Agitate until clog and accumulated debris are loose.

(3) Pour additional water in the drip pan until an unrestricted flow of clean water pours from the end of the drain tube.

(4) Be sure the ball seat (end of drain where ball and spring are inserted) are clean.

Follow-on procedures: 1. Install mist eliminator. (See para 4-32.)

2. Install top panel. (See para 4-24.)

d. Installation

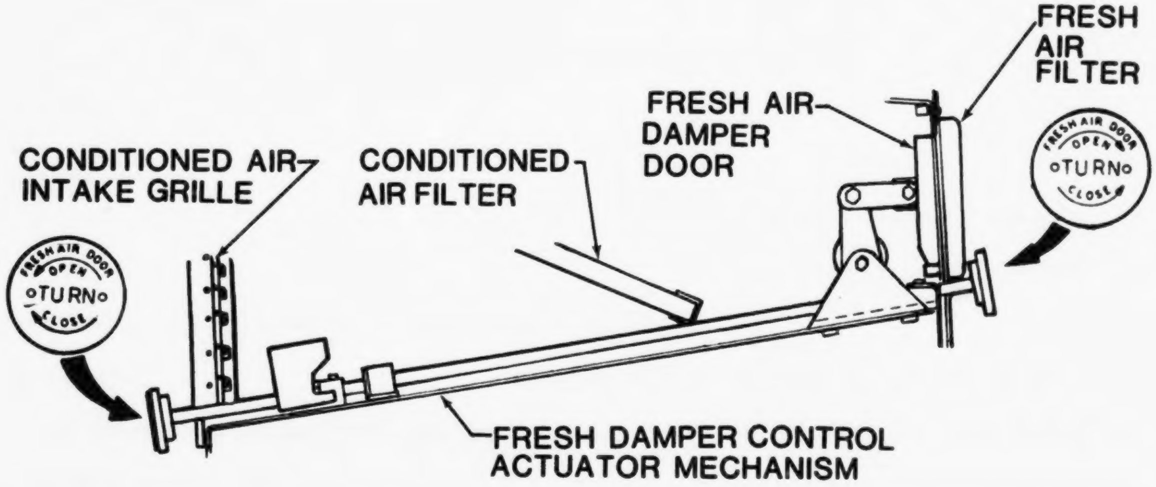
(1) Insert ball and spring. Be sure that ball is above spring.

(2) Depress spring with screwdriver far enough to install cotter pin.

(3) Secure cotter pin.

Follow-on procedure: Install lower front panel. (See para 4-25.)

4-34. FRESH AIR DAMPER


FRESH AIR FILTER
FRESH AIR DAMPER DOOR
FRESH AIR DOOR
OPEN
TURN
CLOSE
CONDITIONED AIR INTAKE GRILLE
CONDITIONED AIR FILTER
FRESH AIR DOOR
OPEN
TURN
CLOSE
FRESH DAMPER CONTROL ACTUATOR MECHANISM

TS4120-370-14/4-39

Figure 4-39. Fresh Air Damper

Preliminary procedures: 1. Remove conditioned air intake grille. (See para 4-29.)

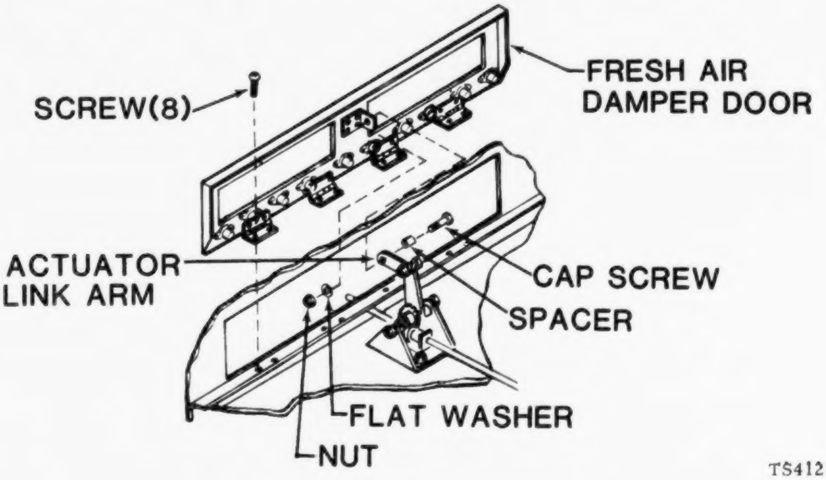
2. Remove conditioned air filter. (See para 4-36.)

3. Remove fresh air filter and frame. (See para 4-35.)

4. Remove actuating cylinder access cover. (See para 4-20.)

a. Removal

(1) Using two wrenches, remove cap screw, spacer, flat washer, and nut from actuator link arm.


SCREW(8)
FRESH AIR DAMPER DOOR
ACTUATOR LINK ARM
CAP SCREW
SPACER
FLAT WASHER
NUT

TS4120-370-14/4-40

Figure 4-40. Fresh Air Damper Door

(2) Using screwdriver, remove eight screws from fresh air damper door hinges.

(3) Remove fresh air damper door.

(4) Using two wrenches, remove cap screw, spacer, flat washer, and nut from link arm.

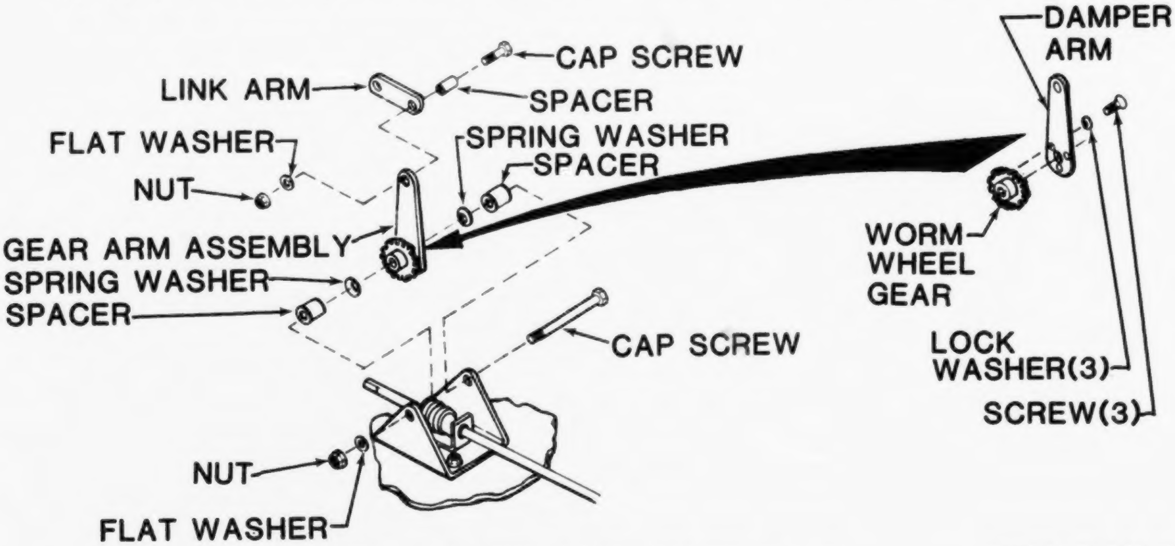

DAMPER ARM
CAP SCREW
LINK ARM
SPACER
FLAT WASHER
SPRING WASHER
SPACER
NUT
GEAR ARM ASSEMBLY
WORM WHEEL GEAR
SPRING WASHER
SPACER
CAP SCREW
LOCK WASHER(3)
SCREW(3)
NUT
FLAT WASHER

Figure 4-41. Worm Wheel Gear and Linkage

TS4120-370-14/4-41

(5) Remove link arm.

(6) Using two wrenches, remove cap screw, nut, and flat washer; and remove gear arm assembly, spring washers, and spacers.

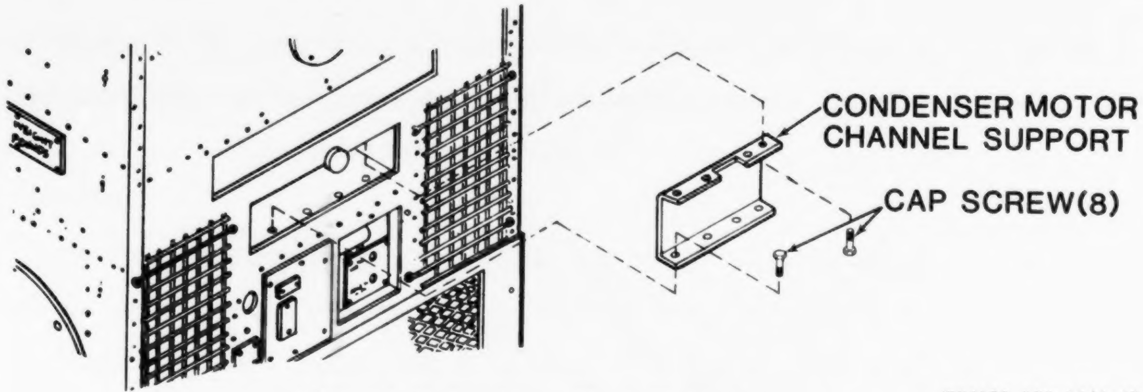

CONDENSER MOTOR CHANNEL SUPPORT
CAP SCREW(8)

Figure 4-42. Condenser Motor Channel Support

TS4120-370-14/4-42

(7) Using wrench, remove eight cap screws from condenser motor channel support.

(8) Remove condenser motor channel support.

(9) Using punch and hammer, remove spring pin from worm gear.

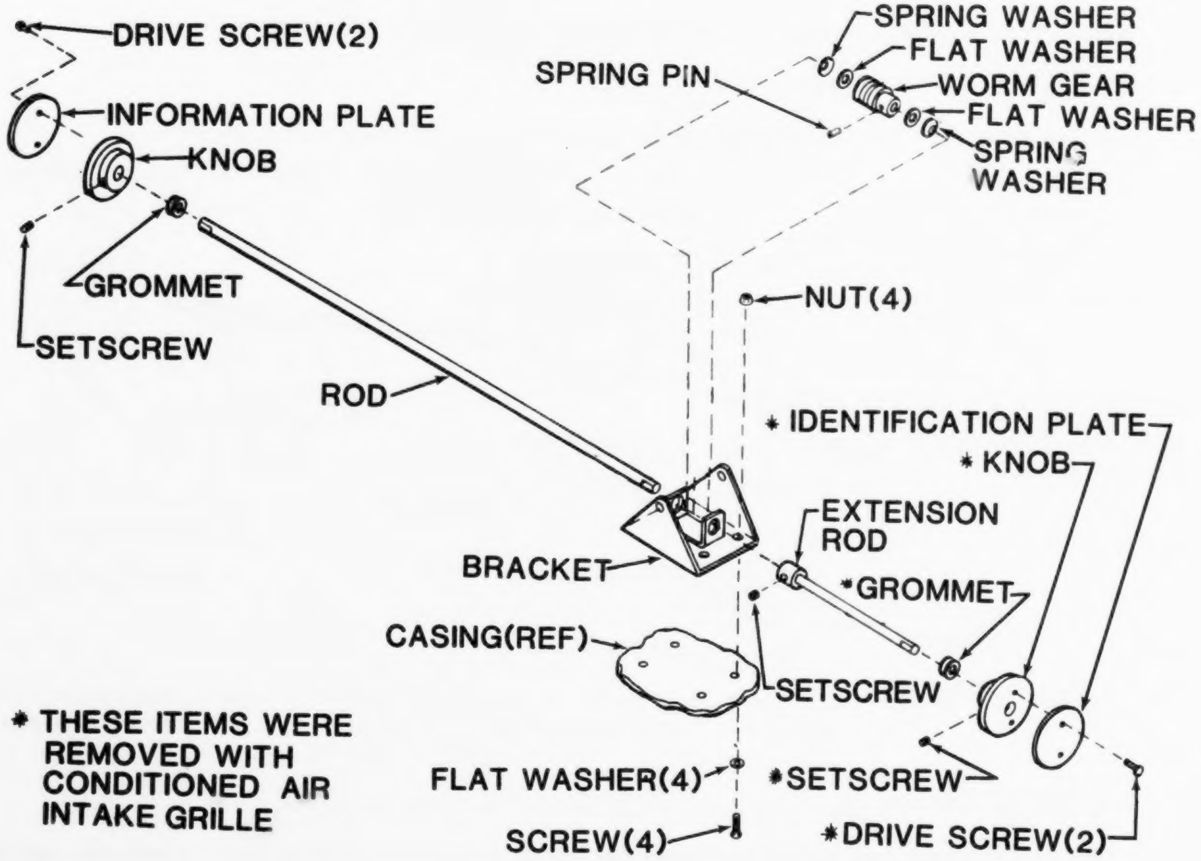

DRIVE SCREW(2)
INFORMATION PLATE
KNOB
GROMMET
SETSCREW
ROD
SPRING WASHER
FLAT WASHER
WORM GEAR
FLAT WASHER
SPRING WASHER
SPRING PIN
NUT(4)
* IDENTIFICATION PLATE
* KNOB
EXTENSION ROD
*GROMMET
BRACKET
CASING(REF)
SETSCREW
* THESE ITEMS WERE REMOVED WITH CONDITIONED AIR INTAKE GRILLE
FLAT WASHER(4)
*SETSCREW
SCREW(4)
*DRIVE SCREW(2)

Figure 4-43. Fresh Air Damper Actuator Mechanism

TS4120-370-14/4-43

(10) Using allen wrench, loosen setscrew in extension rod end.

(11) Pull knob and rod from rear of unit.

(12) Remove two spring washers, two flat washers, and worm gear.

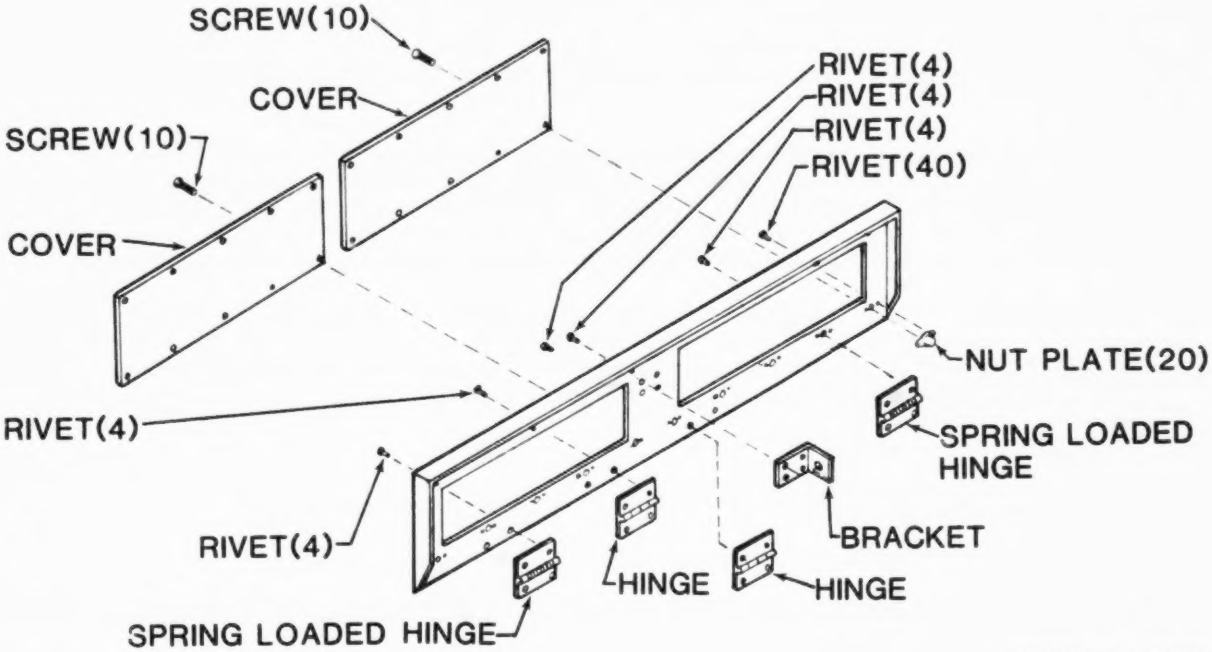
(13) Remove extension rod.

(14) Using screwdriver and wrench, remove four each screws, flat washers, and nuts from bracket.

(15) Remove bracket.

b. Disassembly of damper door

(1) Using screwdriver, remove ten screws from cover.


SCREW(10)
COVER
SCREW(10)
COVER
RIVET(4)
RIVET(4)
RIVET(4)
RIVET(40)
NUT PLATE(20)
SPRING LOADED HINGE
BRACKET
RIVET(4)
RIVET(4)
HINGE
HINGE
SPRING LOADED HINGE

TS4120-370-14/4-44

Figure 4-44. Fresh Air Damper Door

(2) Remove cover.

(3) If other cover is to be removed, repeat steps (1) and (2).

(4) If hinges, bracket, or nut plates are to be removed, drill out the old rivets using a drill bit slightly smaller than the body of the rivet.

c. Inspection

(1) Check all parts for wear and obvious damage.

(2) Check for loose or missing hardware.

(3) Replace all missing or damaged parts.

d. Cleaning

(1) Use a rag or soft brush to remove dust from damper door and linkages.

WARNING

Dry cleaning solvent (Fed Spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

(2) If necessary wash gears, linkages, and associated hardware in dry cleaning solvent (Fed Spec P-D-680).

e. Reassembly of damper door. (See figure 4-44.)

(1) If hinges, bracket, or nut plates were missing, install replacement part with new rivets.

(2) Using screwdriver, secure covers with ten screws in each cover.

f. Installation

(1) Using screwdriver and wrench, secure bracket to casing with four screws, flat washers, and nuts. (See figure 4-43.)

(2) Reinstall grommet in rear of casing, if it was removed or missing.

(3) Install knob on rod end if it was removed.

(4) Insert rod through grommet in rear of casing and through the first hole in the bracket.

(5) Install spring washers, flat washers, and worm gear and insert rod through the remaining bracket hole. (See figure 4-43.)

(6) Aline holes in worm gear and rod and install spring pin.

(7) Slip extension rod onto end of rod.

(8) Aline setscrew with flat on end of rod and tighten setscrew with allen wrench.

(9) Aline condenser motor channel support mounting holes with casing holes.

(10) Using wrench secure condenser motor channel support with eight cap screws. (See figure 4-42.)

(11) Using two wrenches install spacers, spring washers, and gear arm assembly with cap screw, flat washer, and nut. (See figure 4-41.)

(12) Using two wrenches, secure link arm to gear arm assembly with a cap screw, spacer, flat washer, and nut. (See figure 4-40.)

(13) Using screwdriver, secure damper door hinges to casing with eight screws. (See figure 4-40.)

(14) Using two wrenches, connect link arm to bracket on damper door with a cap screw, spacer, flat washer, and nut.

Follow-on procedures:

1. Install actuating cylinder access cover. (See para 4-20.)
2. Install fresh air filter and frame. (See para 4-35.)
3. Install conditioned air filter. (See para 4-36.)
4. Install conditioned air intake grille. (See para 4-34.)

4-35. ELECTRICAL WIRING REPAIR GENERAL

Preferred repair methods consist of replacing wires, terminals, connectors, etc., rather than splicing wires, bending ends to form terminals, and other make-shift procedures; although the latter may be appropriate for emergency field repairs. Determine the proper size and length of wire, or the terminal, or connector to be used for replacement by referring to table 4-3, "Wire List", and to the wiring diagram (figure 4-20).

a. Soldering connections. Wire connections must be made mechanically sound before they are soldered; solder alone does not provide sufficient strength to prevent breakage. Joining surfaces of connections to be soldered must be clean and bright. If a separate flux is used, it should conform to Specification MIL-F-14256 rosin base flux, item 16, Appendix E and should be brushed onto the joint before soldering. If a flux-core solder is used, it should always be rosin-core electrical solder. If an uncored solder is used, it should be a lead-tin solder, item 3, Appendix E, conforming to Specification QQ-S-571. Wires should always be heated to the point at which the solder will melt completely and flow into all parts of the joint. Excessive build-up of solder "gobs" on the joint should be avoided or removed.

b. Insulating joints. The preferred method of insulating electrical joints is by the use of heat-shrink tubing. To apply, cut a piece of heat-shrink tubing of suitable diameter to a one-inch length for covering joints at terminals or connectors, or to a length about ½ inch (1.3 cm) longer than the joint to be insulated, and slide the tubing over the wire before making the joint. After the joint is made, slide the tubing so that it covers the joint, and shrink in place with moderate heat.

c. Splicing wires. To repair broken or cut wires that are otherwise sound, the mating ends can be stripped and spliced. A commercial butt splice can be crimped onto the end to join them, or a "Western Union" wire splice can be made. The latter is made by stripping ¼ - ½ inch (0.6 - 1.3 cm) of insulation from the wire ends, holding the ends parallel and facing opposite directions, then twisting each end around the other wire at least three turns. Solder and apply insulation as described above.

d. Crimping terminals. To install a terminal on the end of a wire, strip ¼ - ½ inch (0.6 -1.3 cm) of insulation from the end of the wire, apply a one-inch piece of heat-shrink tubing (if the terminals are of the uninsulated type), and insert wire end into the shank of the terminal. Crimp the shank, and install heat-shrink tubing, if necessary.

Table 4-3. WIRE LIST

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
		LOOSE WIRES				
TB1-3	MS25036-154	TB1-6	MS25036-154	14	5.5	14.0
TB1-2	MS25036-154	TB1-5	MS25036-154	14	5.5	14.0
TB1-1	MS25036-154	TB1-4	MS25036-154	14	5.5	14.0
TB1-4	MS25036-154	CB1-C	—	16	20.0	50.8
K1-C1	MS25036-108	TB1-3	MS25036-154	14	9.0	22.9
K1-B1	MS25036-108	TB1-2	MS25036-154	14	9.0	22.9
K1-A1	MS25036-108	TB1-1	MS25036-154	14	9.0	22.9
TB1-3	MS25036-157	K7-C2	MS25036-112	10	12.5	31.8
TB1-2	MS25036-157	K7-B2	MS25036-112	10	12.5	31.8
TB1-1	MS25036-157	K7-A2	MS25036-112	10	12.5	31.8
K6-5	—	TB2-3	MS25036-153	16	15.0	38.1
TB2-3	MS25036-153	TB2-2	MS25036-153	16	2.5	6.4
TB2-2	MS25036-153	K9-X1	MS25036-153	16	15.0	38.1
TB2-2	MS25036-153	TB2-1	MS25036-153	16	2.5	6.4
K7-X1	MS25036-153	TB2-1	MS25036-153	16	13.0	33.0
K8-X2	MS25036-153	TB2-2	MS25036-153	16	14.0	35.6
TB2-1	MS25036-153	A1-FL3	—	16	18.0	45.7
K1-X1	MS25036-153	TB2-1	MS25036-153	16	15.0	38.1
K6-2	—	K10-6	(97403) 13216E6192-2	16	12.0	30.5
K7-X2	MS25036-153	K6-2	—	16	6.5	16.5
K6-3	—	K9-X2	MS25036-153	16	15.0	38.1
K7-A2	MS25036-112	K9-A1	MS25036-112	10	20.0	50.8
K7-B2	MS25036-112	K9-B1	MS25036-112	10	20.0	50.8
K7-C2	MS25036-112	K9-C1	MS25036-112	10	20.0	50.8
T-X2	MS25036-106	A1-FL1	—	16	5.0	12.7
T-X1	MS25036-106	A1-FL2	—	16	6.5	16.5
K9-A1	MS25036-108	K8-A2	MS25036-108	16	8.5	21.6
K9-B1	MS25036-108	K8-B2	MS25036-108	16	8.5	21.6
K9-C1	MS25036-108	K8-C2	MS25036-108	16	8.5	21.6
K9-X1	MS25036-153	JB-GND	MS25036-108	16	15.0	38.1
K9-A2	MS25036-112	CB1-C1	(97403) 13211E8288	10	11.0	27.9
K9-B2	MS25036-112	CB1-B1	(97403) 13211E8288	10	24.0	61.0
K9-C2	MS25036-112	CB1-A1	(97403) 13211E8288	10	11.0	27.9
K6-4	—	K1-B1	MS25036-108	16	11.0	27.9
K6-6	—	K10-A	(97403) 13216E6192-2	16	11.0	27.9
K6-1	—	K10-9	(97403) 13216E6192-2	16	11.0	27.9
HR3-B	MS25036-108	HR4-B	MS25036-108	14	6.0	15.2
HR2-B	MS25036-108	HR5-B	MS25036-108	14	16.0	40.6
HR1-B	MS25036-108	HR6-B	MS25036-108	14	24.5	62.2
FR-GND	MS25036-116	JB-GND	MS25036-115	8	20.0	50.8
S1-BL	MS25036-153	S/WA-12	(97403) 13211E8288	16	6.0	15.2
S5-1	MS25036-153	S6-2	MS25036-153	16	3.0	7.6
K6-4	—	TB2-10	MS25036-153	16	8.0	20.3
K10-B	(97403) 13216E6192-2	K1-C1	MS25036-108	16	8.0	20.3
HR8-C	MS25036-108	HR8-D	MS25036-108	16	3.0	7.6

Table 4-3. WIRE LIST (cont.)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
		WIRING HARNESS J8				
GND	MS25036-108	J8-A	(97403) 13211E8399C28-9P	16	9.0	22.9
S/WC-3A	(97403) 13211E8288	J8-B	(97403) 13211E8399C28-9P	14	9.0	22.9
S/WD-4C	(97403) 13211E8288	J8-C	(97403) 13211E8399C28-9P	14	9.0	22.9
S/WD-4A	(97403) 13211E8288	J8-D	(97403) 13211E8399C28-9P	14	9.0	22.9
S/WD-42	(97403) 13211E8288	J8-E	(97403) 13211E8399C28-9P	14	9.0	22.9
S/WD-41	(97403) 13211E8288	J8-F	(97403) 13211E8399C28-9P	14	9.0	22.9
S/WC-32	(97403) 13211E8288	J8-G	(97403) 13211E8399C28-9P	14	9.0	22.9
S/WA-1D	(97403) 13211E8288	J8-H	(97403) 13211E8399C28-9P	16	9.0	22.9
S/WA-1B	(97403) 13211E8288	J8-J	(97403) 13211E8399C28-9P	16	9.0	22.9
S/WA-1A	(97403) 13211E8288	J8-K	(97403) 13211E8399C28-9P	16	9.0	22.9
S/WB-2B	(97403) 13211E8288	J8-L	(97403) 13211E8399C28-9P	16	9.0	22.9
S/WB-22	(97403) 13211E8288	J8-M	(97403) 13211E8399C28-9P	16	9.0	22.9
S/WB-22	—	S/WA-11	—	16	4.0	10.2
S/WA-11	(97403) 13211E8288	S1-R	MS25036-153	16	9.0	22.9
		WIRING HARNESS J1-P13				
J1-A	MS3100R24-22P	P13-A	MS3106R24-22SX	8	50.0	127.0
J1-B	MS3100R24-22P	P13-B	MS3106R24-22SX	8	50.0	127.0
J1-C	MS3100R24-22P	P13-C	MS3106R24-22SX	8	50.0	127.0
J1-D	MS3100R24-22P	P13-D	MS3106R24-22SX	8	50.0	127.0
		WIRING HARNESS P14-J12				
P14-A	MS3106R28-9PW	J12-A	MS3100R28-9SZ	14	60.0	152.4
P14-B	MS3106R28-9PW	J12-B	MS3100R28-9SZ	14	60.0	152.4
P14-C	MS3106R28-9PW	J12-C	MS3100R28-9SZ	14	60.0	152.4
P14-D	MS3106R28-9PW	J12-D	MS3100R28-9SZ	14	60.0	152.4
P14-E	MS3106R28-9PW	J12-E	MS3100R28-9SZ	14	60.0	152.4
P14-F	MS3106R28-9PW	J12-F	MS3100R28-9SZ	14	60.0	152.4
P14-G	MS3106R28-9PW	J12-G	MS3100R28-9SZ	16	60.0	152.4
P14-H	MS3106R28-9PW	J12-H	MS3100R28-9SZ	16	60.0	152.4
P14-J	MS3106R28-9PW	J12-J	MS3100R28-9SZ	16	60.0	152.4
P14-K	MS3106R28-9PW	J12-K	MS3100R28-9SZ	16	60.0	152.4
P14-L	MS3106R28-9PW	J12-L	MS3100R28-9SZ	16	60.0	152.4
P14-M	MS3106R28-9PW	J12-M	MS3100R28-9SZ	16	60.0	152.4

Table 4-3. WIRE LIST (cont.)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
		WIRING HARNESS P12-P9-P3-J7				
P12-A	MS3106R28-9PZ	J7-A	MS3100R20-15S	14	20.0	50.8
P12-B	MS3106R28-9PZ	J7-B	MS3100R20-15S	14	20.0	50.8
P12-C	MS3106R28-9PZ	J7-C	MS3100R20-15S	14	20.0	50.8
P12-D	MS3106R28-9PZ	J7-D	MS3100R20-15S	14	20.0	50.8
P12-E	MS3106R28-9PZ	J7-E	MS3100R20-15S	14	20.0	50.8
P12-F	MS3106R28-9PZ	J7-F	MS3100R20-15S	14	20.0	50.8
P12-J	MS3106R28-9PZ	P3-A	MS3100R14S-7S	16	20.0	50.8
P12-G	MS3106R28-9PZ	P3-C	MS3100R14S-7S	16	20.0	50.8
P12-H	MS3106R28-9PZ	P3-B	MS3100R14S-7S	16	20.0	50.8
P12-L	MS3106R28-9PZ	P9-C	MS3100R14S-7S	16	20.0	50.8
P12-K	MS3106R28-9PZ	P9-B	MS3100R14S-7S	16	20.0	50.8
P12-M	MS3106R28-9PZ	P9-A	MS3100R14S-7S	16	20.0	50.8
		WIRING HARNESS P8-P4-P16				
P8-A	MS3100R28-9S	P4-K	MS3106R36-14P	16	31.0	78.7
P8-B	MS3100R28-9S	P4-B	MS3106R36-14P	14	31.0	78.7
P8-C	MS3100R28-9S	P4-D	MS3106R36-14P	14	31.0	78.7
P8-D	MS3100R28-9S	P4-F	MS3106R36-14P	14	31.0	78.7
P8-E	MS3100R28-9S	P4-H	MS3106R36-14P	14	31.0	78.7
P8-F	MS3100R28-9S	P4-J	MS3106R36-14P	14	31.0	78.7
P8-G	MS3100R28-9S	P4-A	MS3106R36-14P	14	31.0	78.7
P8-H	MS3100R28-9S	P16-A	MS3106R20-7S	16	41.0	104.1
P8-J	MS3100R28-9S	P4-M	MS3106R36-14P	16	31.0	78.7
P8-K	MS3100R28-9S	P4-N	MS3106R36-14P	16	31.0	78.7
P8-L	MS3100R28-9S	P4-P	MS3106R36-14P	16	31.0	78.7
P8-M	MS3100R28-9S	P16-H	MS3106R20-7S	16	41.0	104.1
P16-F	MS3106R20-7S	P4-L	MS3106R36-14P	16	39.0	99.1
P16-C	MS3106R20-7S	P4-Q	MS3106R36-14P	16	39.0	99.1
P16-E	MS3106R20-7S	P4-E	MS3106R36-14P	16	39.0	99.1
P16-D	MS3106R20-7S	P4-G	MS3106R36-14P	16	39.0	99.1
P16-G	MS3106R20-7S	P4-1	MS3106R36-14P	16	39.0	99.1
P16-B	MS3106R20-7S	P4-C	MS3106R36-14P	16	39.0	99.1
		WIRING HARNESS P10-P6-P5-P2-P11				
P10-A	MS3106R36-14PX	P11-D	MS3106R24-11S	10	24.0	61.0
P10-B	MS3106R36-14PX	P2-A	MS3106R18-11S	12	24.0	61.0
P10-C	MS3106R36-14PX	P11-E	MS3106R24-11S	10	24.0	61.0
P10-D	MS3106R36-14PX	P2-B	MS3106R18-11S	12	24.0	61.0
P10-E	MS3106R36-14PX	P11-F	MS3106R24-11S	10	24.0	61.0
P10-F	MS3106R36-14PX	P11-A	MS3106R24-11S	16	24.0	61.0
P10-G	MS3106R36-14PX	P11-G	MS3106R24-11S	16	24.0	61.0
P10-H	MS3106R36-14PX	P11-B	MS3106R24-11S	16	24.0	61.0
P10-I	MS3106R36-14PX	P11-H	MS3106R24-11S	16	24.0	61.0
P10-J	MS3106R36-14PX	P2-C	MS3106R18-11S	12	24.0	61.0
P10-K	MS3106R36-14PX	P6-B	MS3106R12S-3S	16	26.0	66.1
P10-L	MS3106R36-14PX	P5-A	MS3106R12S-3S	16	32.0	81.3
P10-M	MS3106R36-14PX	P5-B	MS3106R12S-3S	16	32.0	81.3
P10-N	MS3106R36-14PX	P2-E	MS3106R18-11S	12	24.0	61.0
P10-P	MS3106R36-14PX	P6-A	MS3106R12S-3S	16	26.0	66.1
P10-Q	MS3106R36-14PX	P2-D	MS3106R18-11S	12	24.0	61.0

Table 4-3. WIRE LIST (cont.)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
		WIRING HARNESS J19-J20				
J20-A	MS3100R28-9S	J19-A	(97403) 13211E8399C28-9P	14	56.0	142.3
J20-B	MS3100R28-9S	J19-B	(97403) 13211E8399C28-9P	14	56.0	142.3
J20-C	MS3100R28-9S	J19-C	(97403) 13211E8399C28-9P	14	56.0	142.3
J20-D	MS3100R28-9S	J19-D	(97403) 13211E8399C28-9P	14	56.0	142.3
J20-E	MS3100R28-9S	J19-E	(97403) 13211E8399C28-9P	14	56.0	142.3
J20-F	MS3100R28-9S	J19-F	(97403) 13211E8399C28-9P	14	56.0	142.3
J20-G	MS3100R28-9S	J19-G	(97403) 13211E8399C28-9P	14	56.0	142.3
J20-H	MS3100R28-9S	J19-H	(97403) 13211E8399C28-9P	16	56.0	142.3
J20-J	MS3100R28-9S	J19-J	(97403) 13211E8399C28-9P	16	56.0	142.3
J20-K	MS3100R28-9S	J19-K	(97403) 13211E8399C28-9P	16	56.0	142.3
J20-L	MS3100R28-9S	J19-L	(97403) 13211E8399C28-9P	16	56.0	142.3
J20-M	MS3100R28-9S	J19-M	(97403) 13211E8399C28-9P	16	56.0	142.3
		WIRING HARNESS J17-J18				
J18-A	MS3100R24-22P	J17-A	(97403) 13211E8399C24-22S	8	56.0	142.3
J18-B	MS3100R24-22P	J17-B	(97403) 13211E8399C24-22S	8	56.0	142.3
J18-C	MS3100R24-22P	J17-C	(97403) 13211E8399C24-22S	8	56.0	142.3
J18-D	MS3100R24-22P	J17-D	(97403) 13211E8399C24-22S	8	56.0	142.3
		WIRING HARNESS J10				
J10-A	MS3102R36-14SX	CB1-C2	(97403) 13211E8288	10	7.0	17.8
J10-B	MS3102R36-14SX	K7-A1	MS25036-108	16	13.0	33.1
J10-C	MS3102R36-14SX	CB1-B2	(97403) 13211E8288	10	7.0	17.8
J10-D	MS3102R36-14SX	K7-C1	MS25036-108	16	15.0	38.1
J10-E	MS3102R36-14SX	CB1-A2	(97403) 13211E8288	10	7.0	17.8
J10-F	MS3102R36-14SX	TB2-4	MS25036-153	16	15.0	38.1
J10-G	MS3102R36-14SX	K8-B2	MS25036-108	16	15.0	38.1
J10-H	MS3102R36-14SX	TB2-8	MS25036-153	16	15.0	38.1
J10-I	MS3102R36-14SX	K8-A2	MS25036-108	16	13.0	33.1
J10-J	MS3102R36-14SX	K7-B1	MS25036-108	16	14.0	35.6
J10-K	MS3102R36-14SX	K1-X1	MS25036-153	16	11.0	28.0
J10-L	MS3102R36-14SX	K9-X2	MS25036-153	16	18.0	45.8

Table 4-3. WIRE LIST (cont.)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
J10-M	MS3102R36-14SX	TB2-3	MS25036-153	16	15.0	38.1
J10-N	MS3102R36-14SX	K7-X2	MS25036-153	16	12.0	30.5
J10-P	MS3102R36-14SX	TB2-9	MS25036-153	16	11.0	28.0
J10-Q	MS3102R36-14SX	TB2-4	MS25036-153	16	15.0	38.1
WIRING HARNESS J4						
J4-A	MS3102R36-14S	TB1-4	MS25036-154	14	12.0	30.5
J4-B	MS3102R36-14S	TB2-5	MS25036-153	14	12.0	30.5
J4-D	MS3102R36-14S	TB2-6	MS25036-153	14	12.0	30.5
J4-E	MS3102R36-14S	T-H1	MS25036-106	16	12.0	30.5
J4-F	MS3102R36-14S	TB2-7	MS25036-153	14	12.0	30.5
J4-G	MS3102R36-14S	T-H2	MS25036-106	16	12.0	30.5
J4-H	MS3102R36-14S	TB1-5	MS25036-154	14	12.0	30.5
J4-I	MS3102R36-14S	CB1-NO	—	16	12.0	30.5
J4-J	MS3102R36-14S	TB1-6	MS25036-154	14	12.0	30.5
J4-K	MS3102R36-14S	JB-GND	MS25036-108	16	6.0	15.3
J4-L	MS3102R36-14S	TB1-5	MS25036-154	14	12.0	30.5
J4-M	MS3102R36-14S	TB2-9	MS25036-153	14	12.0	30.5
J4-N	MS3102R36-14S	K1-X2	MS25036-153	16	12.0	30.5
J4-P	MS3102R36-14S	K8-X1	MS25036-153	16	12.0	30.5
J4-Q	MS3102R36-14S	A1-FL4	—	16	12.0	30.5
J4-C	MS3102R36-14S	TB2-8	MS25036-153	14	12.0	30.5
WIRING HARNESS J14						
J14-A	MS3102R28-9SW	TB2-5	MS25036-153	14	14.0	35.6
J14-B	MS3102R28-9SW	TB2-7	MS25036-153	14	14.0	35.6
J14-C	MS3102R28-9SW	TB2-6	MS25036-153	14	14.0	35.6
J14-D	MS3102R28-9SW	KI-C2	MS25036-108	14	14.0	35.6
J14-E	MS3102R28-9SW	K1-B2	MS25036-108	14	14.0	35.6
J14-F	MS3102R28-9SW	K1-A2	MS25036-108	14	14.0	35.6
J14-G	MS3102R28-9SW	K8-C1	MS25036-108	16	14.0	35.6
J14-H	MS3102R28-9SW	K8-B1	MS25036-108	16	14.0	35.6
J14-J	MS3102R28-9SW	K8-A1	MS25036-108	16	14.0	35.6
J14-K	MS3102R28-9SW	K8-C1	MS25036-108	16	14.0	35.6
J14-L	MS3102R28-9SW	K8-B1	MS25036-108	16	14.0	35.6
J14-M	MS3102R28-9SW	K8-A1	MS25036-108	16	14.0	35.6
WIRING HARNESS J13						
J13-A	MS3102R24-22PX	TB1-1	MS25036-116	8	10.0	25.4
J13-B	MS3102R24-22PX	TB1-2	MS25036-116	8	10.0	25.4
J13-C	MS3102R24-22PX	TB1-3	MS25036-116	8	10.0	25.4
J13-D	MS3102R24-22PX	JB-GND	MS25036-115	8	3.0	7.6

Table 4-3. WIRE LIST (cont.)

TERMINATION		TERMINATION		AWG WIRE SIZE	LENGTH	
FROM	TERMINAL TYPE	TO	TERMINAL TYPE		IN.	CM
		WIRING HARNESS J21				
J21-A	MS3102R16S-8S	TB2-10	MS25036-153	16	11.0	27.9
J21-B	MS3102R16S-8S	K10-A	MS25036-106	16	5.0	12.7
J21-C	MS3102R16S-8S	K10-7	MS25036-106	16	5.0	12.7
J21-D	MS3102R16S-8S	K10-1	MS25036-106	16	10.0	25.4
J21-E	MS3102R16S-8S	K10-B	MS25036-106	16	5.0	12.7
		WIRING HARNESS P7				
P7-A	MS3106R20-15P	HR1-A	MS25036-108	14	54.0	137.2
P7-B	MS3106R20-15P	HR2-A	MS25036-108	14	51.0	129.6
P7-C	MS3106R20-15P	HR3-A	MS25036-108	14	42.0	106.7
P7-D	MS3106R20-15P	HR4-A	MS25036-108	14	41.0	104.2
P7-E	MS3106R20-15P	HR5-A	MS25036-108	14	39.0	99.1
P7-F	MS3106R20-15P	HR6-A	MS25036-108	14	37.0	94.0
		WIRING HARNESS THERMOSTAT S3				
S3-6	(97403)13214E4036	HR3-B	MS25036-112	12	5.0	12.7
S3-4	(97403)13214E4036	HR1-B	MS25036-112	12	15.5	39.4
S3-5	(97403)13214E4036	HR5-B	MS25036-112	12	8.5	21.6
		WIRING HARNESS J16				
J16-A	MS3102R20-7P	S6-1	MS25036-153	16	7.0	17.8
J16-B	MS3102R20-7P	S5-2	MS25036-153	16	7.0	17.8
J16-C	MS3102R20-7P	CB3-A2	(97403) 13211E8288	16	13.0	33.1
J16-D	MS3102R20-7P	CB2-A2	(97403) 13211E8288	16	13.0	33.1
J16-E	MS3102R20-7P	CB2-B2	(97403) 13211E8288	16	13.0	33.1
J16-F	MS3102R20-7P	CB2-B1	(97403) 13211E8288	16	13.0	33.1
J16-G	MS3102R20-7P	CB2-A1	(97403) 13211E8288	16	13.0	33.1
J16-H	MS3102R20-7P	CB3-A1	(97403) 13211E8288	16	13.0	33.1
		WIRING HARNESS P21				
P21-A	MS3106R16S-8P	S10-1	—	—	—	—
P21-B	MS3106R16S-8P	S10-2	—	—	—	—
P21-C	MS3106R16S-8P	S10-3	—	—	—	—
P21-D	MS3106R16S-8P	HR8-A	MS25036-108	16	24.0	61.0
P21-E	MS3106R16S-8P	HR8-B	MS25036-108	16	24.0	61.0

4-36. CONTROL PANEL

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

Preliminary procedure: Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

NOTE

See paragraph 4-7 for remote mounting of control panel.

a. Removal. (If control panel is remote mounted, see facility or shelter manual.)

(1) Using allen wrench, loosen setscrew and remove front fresh air damper control knob.

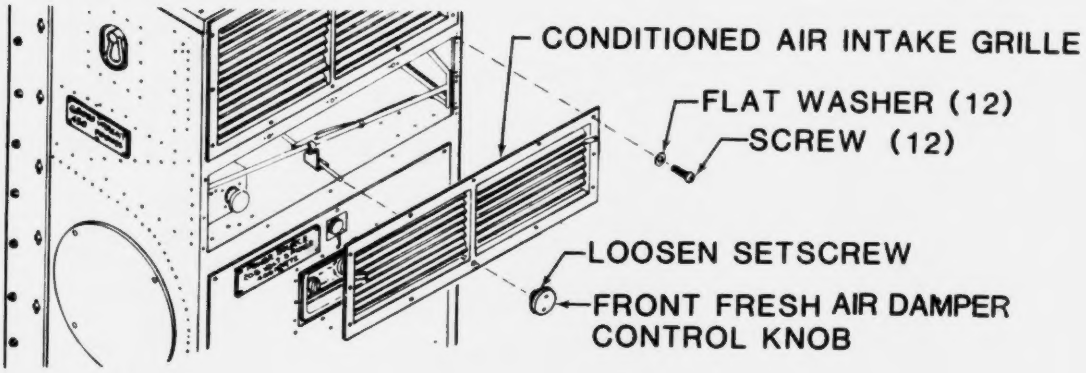

CONDITIONED AIR INTAKE GRILLE
FLAT WASHER (12)
SCREW (12)
LOOSEN SETSCREW
FRONT FRESH AIR DAMPER CONTROL KNOB

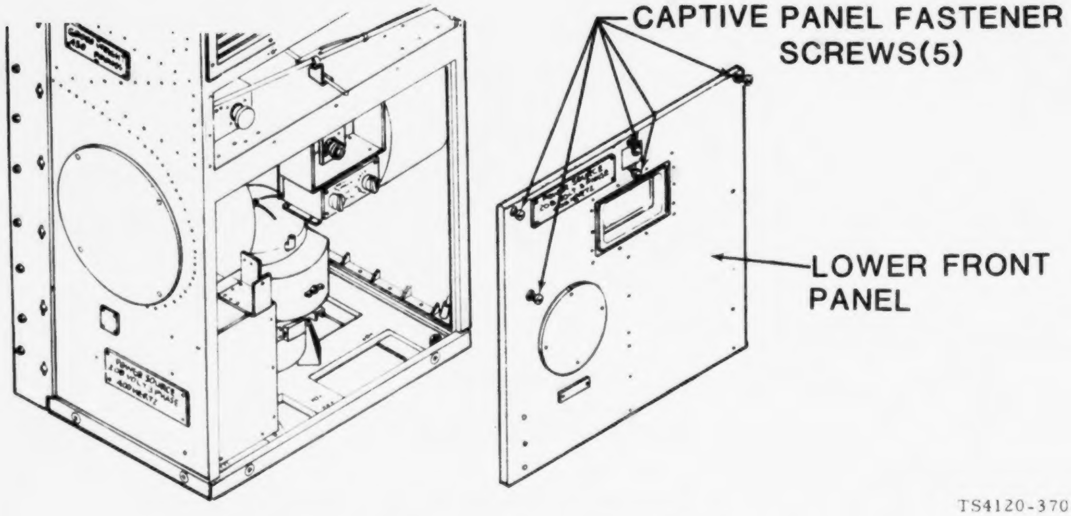
Figure 4-45. Conditioned Air Intake Grille

TS4120-370-14/4-45

(2) Using screwdriver, remove twelve screws and flat washers. Remove conditioned air intake grille. Be careful not to damage grille gaskets.

(3) Using screwdriver, loosen five captive panel fastener screws.

(4) Tip top of lower front panel away from unit and lift panel up to clear flange on bottom of panel.


CAPTIVE PANEL FASTENER SCREWS(5)
LOWER FRONT PANEL

TS4120-370-14/4-46

Figure 4-46. Lower Front Panel

(5) Using screwdriver and wrench, loosen screw and nut in the two loop clamps that hold the sensing bulb and drain line.

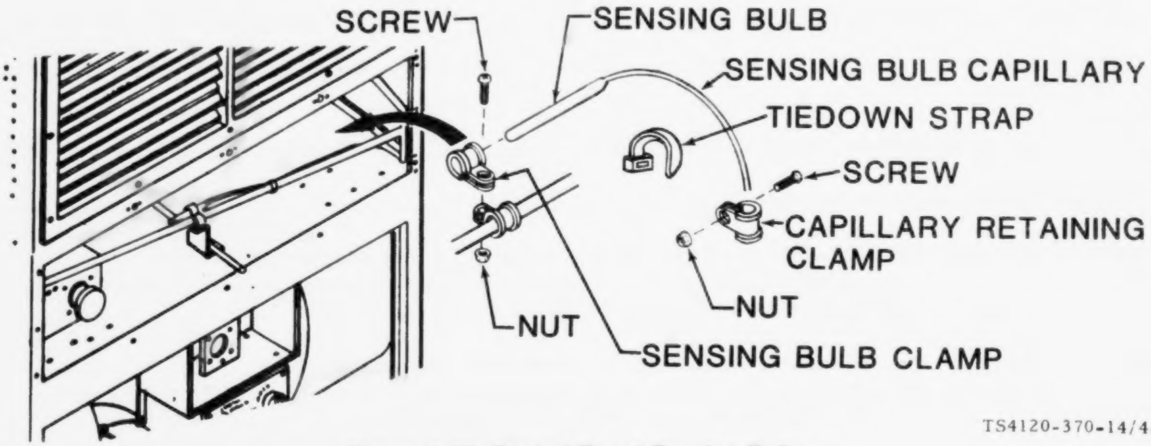
CAUTION

Take care that sensing bulb capillary line is not kinked and that bulb and capillary are not cut or damaged during removal.

(6) Using screwdriver and wrench, rremove screw, nut, and clamp that retain sensing bulb capillary to side casing.

(7) Using knife, carefully cut and remove plastic tie down strap.

(8) Slip sensing bulb out of clamp and carefully guide capillary line and sensing bulb down into lower compartment.


SCREW
SENSING BULB
SENSING BULB CAPILLARY
TIEDOWN STRAP
SCREW
CAPILLARY RETAINING CLAMP
NUT
NUT
SENSING BULB CLAMP

TS4120-370-14/4-47

Figure 4-47. Control Panel Sensing Bulb

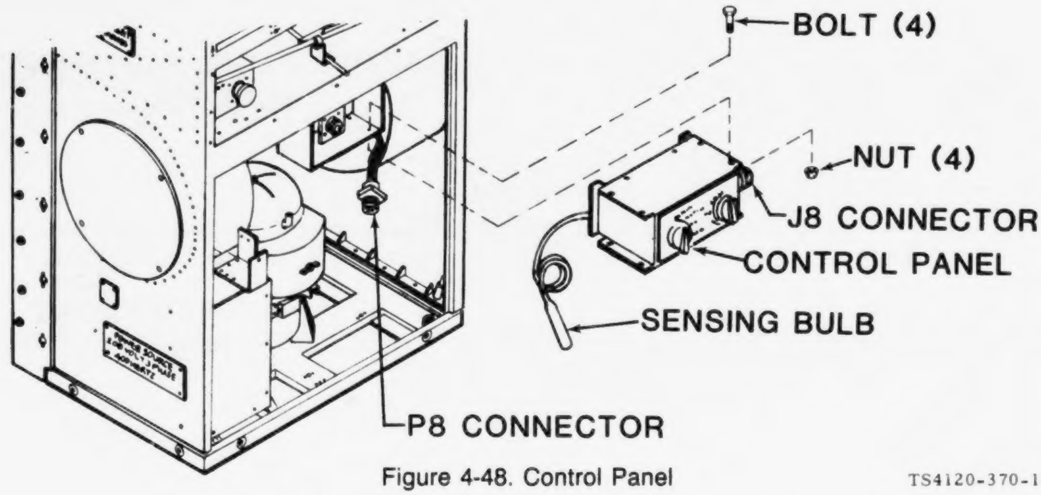


Figure 4-48. Control Panel

TS4120-370-14/4-48

(9) Disconnect wiring harness connector P8 from connector J8 on the control panel.

(10) Using wrenches, remove four bolts and nuts and remove control panel from air conditioner.

b. Test/Replace/Repair. See the following paragraphs for individual component test, replacement, and repair.

(1) Wiring harness and electrical leads. (See para 4-37.)

(2) TEMPerature control thermostat (S1). (See para 4-38.)

(3) Mode selector (rotary) switch (S). (See para 4-39.)

(4) Control panel housing. (See para 4-40.)

c. Installation

(1) Using wrenches, secure control panel to support with four bolts and nuts.

CAUTION

Take care that sensing bulb capillary line is not kinked and that bulb and capillary are not cut or damaged during installation.

(2) Carefully feed sensing bulb and capillary up and into conditioned air intake compartment. (See fig. 4-47.)

(3) Slide sensing bulb into loop clamp located behind drain line loop clamp. Tighten clamp screw and nut. (See fig. 4-47.)

(4) Dress the capillary line along side of the drain line and secure with tie down strap. (See fig. 4-47.)

(5) Coil excess capillary tubing in recess behind control panel.

(6) Using screwdriver and wrench, secure capillary retaining clamp with screw and nut.

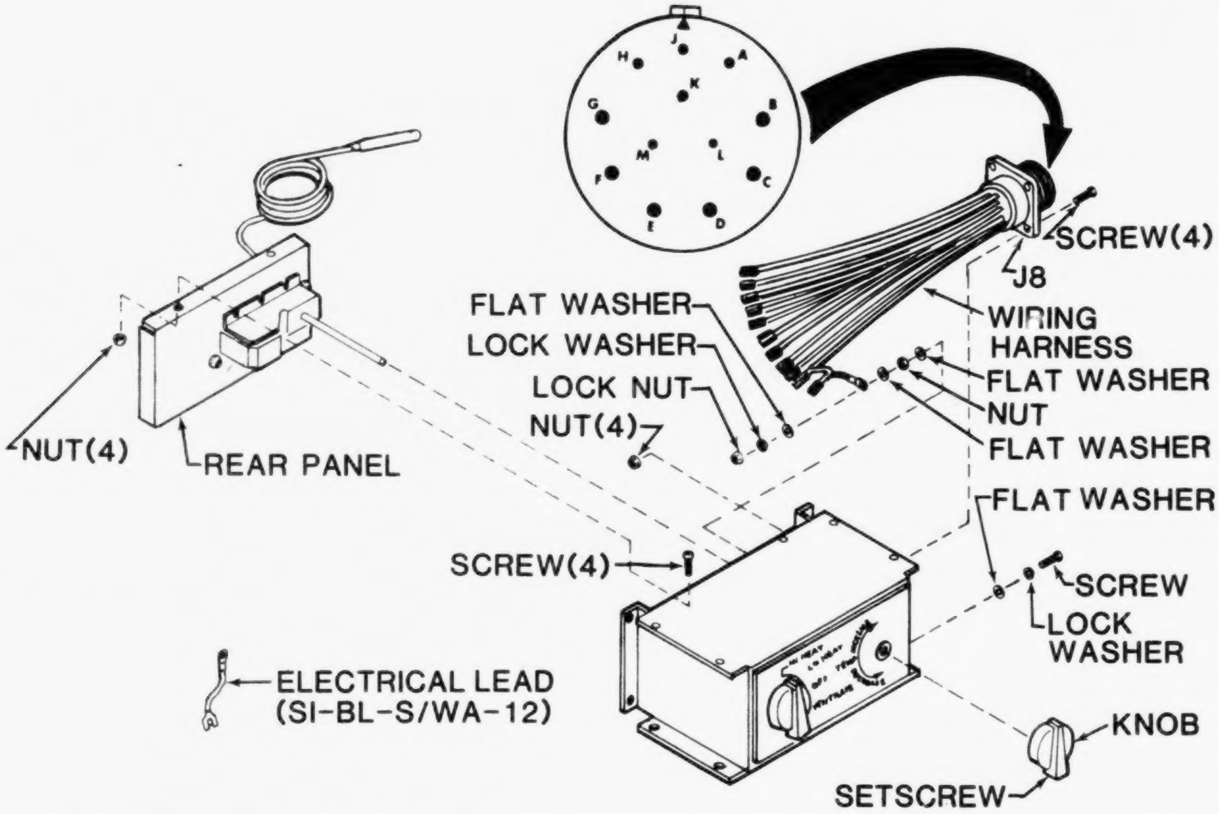
(7) Connect P8 connector and harness to connector J8 on the control box.

Follow-on procedures:

1. Install conditioned air intake grille. (See para 4-29.)
2. Install lower front panel. (See para 4-25.)
3. Connect power.

4-37. WIRING HARNESS AND ELECTRICAL LEAD, CONTROL PANEL

Preliminary procedure: Remove control panel. (See para 4-36.)


J
A
H
K
G
B
M
L
F
C
E
D
SCREW(4)
J8
WIRING HARNESS
FLAT WASHER
NUT
FLAT WASHER
FLAT WASHER
LOCK WASHER
LOCK NUT
NUT(4)
NUT(4)
REAR PANEL
FLAT WASHER
SCREW(4)
SCREW
LOCK WASHER
ELECTRICAL LEAD (SI-BL-S/WA-12)
KNOB
SETSCREW

TS4120-370-14/4-49

Figure 4-49. Wiring Harness and Electrical Lead, Control Panel

a. Access

(1) Using allen wrench, loosen TEMPerature control thermostat knob setscrew.

(2) Remove knob.

(3) Using screwdriver and wrench, remove four screws and nuts that secure rear panel.

(4) Pull rear panel away from box as far as harness will allow.

b. Inspection/Test

(1) Check connector for general condition and loose, broken, or missing contacts. Replace connector if damaged.

(2) Check individual wires for loose solder connections, terminal lug connections, cut or frayed insulation, and cut or broken wires.

(3) See wiring diagram (fig. 4-20) and continuity test individual wires. Repair or replace wires with no continuity.

c. Removal

(1) Using screwdriver and wrench, remove four screws and nuts from J8 connector.

(2) Using screwdriver and wrench, remove lock nut, lock washer, and flat washer from ground stud.

(3) Tag and disconnect leads from switches.

(4) Remove harness and lead.

d. Repair

(1) See paragraph 4-35 for general wire repair instructions.

(2) See table 4-3 (Wire List) for wire lengths and terminal information when individual wires are replaced.

e. Installation

(1) See tags and wiring diagram (fig. 4-20) and reconnect leads.

(2) Using screwdriver and wrench, secure ground wire to ground stud with flat washer, lock washer, and lock nut.

(3) Remove tags.

(4) Using screwdriver and wrench, secure connector J8 to box with four screws and nuts.

(5) Insert rear panel into box and aline holes.

(6) Using screwdriver and wrench, secure rear panel with four screws and nuts.

(7) Place TEMPerature control thermostat knob on shaft and aline setscrew with flat on shaft.

(8) Using allen wrench, tighten setscrew.

Follow-on procedure: Install control panel. (See para 4-36.)

4-38. TEMPERATURE CONTROL THERMOSTAT (S1)

Preliminary procedure: Remove control panel. (See para 4-36.)

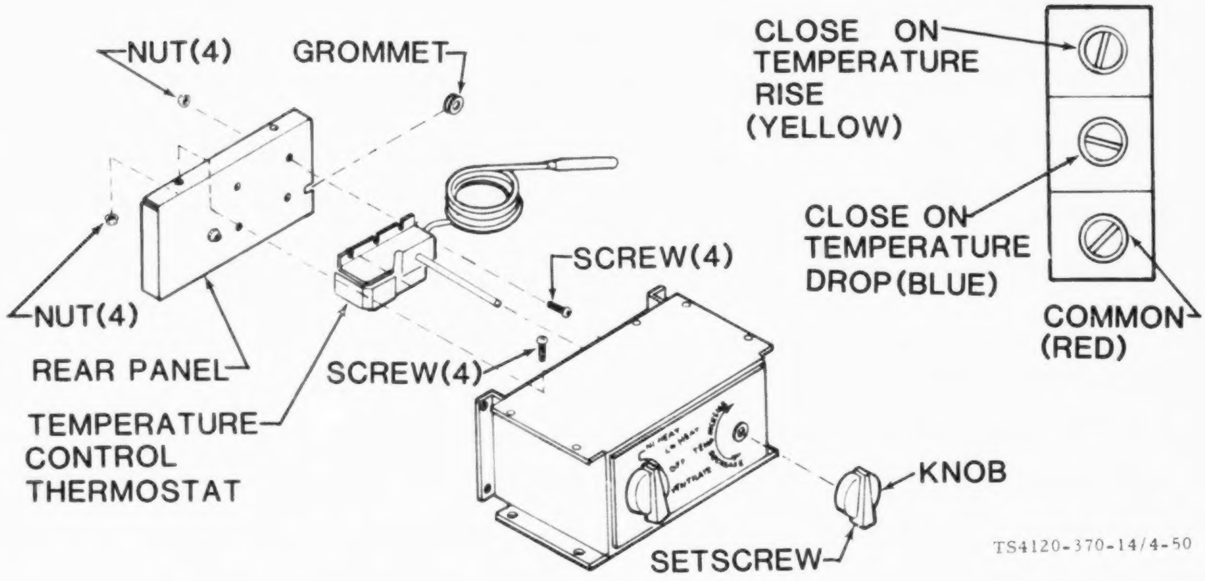

NUT(4)
GROMMET
NUT(4)
REAR PANEL
TEMPERATURE CONTROL THERMOSTAT
SCREW(4)
SCREW(4)
CLOSE ON TEMPERATURE RISE (YELLOW)
CLOSE ON TEMPERATURE DROP(BLUE)
COMMON (RED)
KNOB
SETSCREW
TS4120-370-14/4-50

Figure 4-50. TEMPerature Control Thermostat (S1)

a. Access

(1) Using allen wrench, loosen TEMPerature control thermostat knob setscrew.

(2) Remove knob.

(3) Using screwdriver and wrench, remove four screws and nuts that secure rear panel.

(4) Pull rear panel away from box as far as harness will allow.

b. Inspection

(1) Check that leads are properly connected. (See wiring diagram, fig. 4-20.)

(2) Check that capillary line and sensing bulb are not damaged.

(3) Check TEMPerature control thermostat for signs of overheating or other obvious damage. Replace if damaged.

c. Test

(1) Using multimeter, place probes on the red and blue terminals.

(2) Turn TEMPerature control thermostat shaft fully clockwise.

(3) Check continuity. If temperature at sensing bulb is above 40°F (5°C), there should be no continuity.

(4) Slowly turn shaft counterclockwise until continuity is indicated. Turn shaft back and forth slightly to check that switch contacts open and close on a very narrow band.

(5) Place multimeter probes on the red and yellow terminals.

(6) Turn TEMPerature control thermostat shaft fully counterclockwise.

(7) Check continuity. If temperature at sensing bulb is below 90°F (32°C) there should be no continuity.

(8) Slowly turn shaft clockwise until continuity is indicated. Turn shaft back and forth slightly to check that switch contacts open and close on a very narrow band.

(9) Replace TEMPerature control thermostat if it fails any of the above tests.

d. Removal

(1) Tag and disconnect leads.

(2) Using screwdriver and wrench, remove four screws and nuts.

(3) Remove TEMPerature control thermostat.

e. Installation

(1) Using screwdriver and wrench, secure TEMPerature control thermostat to rear panel with four screws and nuts.

(2) Place capillary line through notch and split grommet in rear panel.

(3) See tags and wiring diagram, figure 4-20, and connect leads.

NOTE

Take care that sensing bulb capillary line is not kinked or mashed.

(4) Insert rear panel into box and aline holes.

(5) Using screwdriver and wrench, secure rear panel with four screws and nuts.

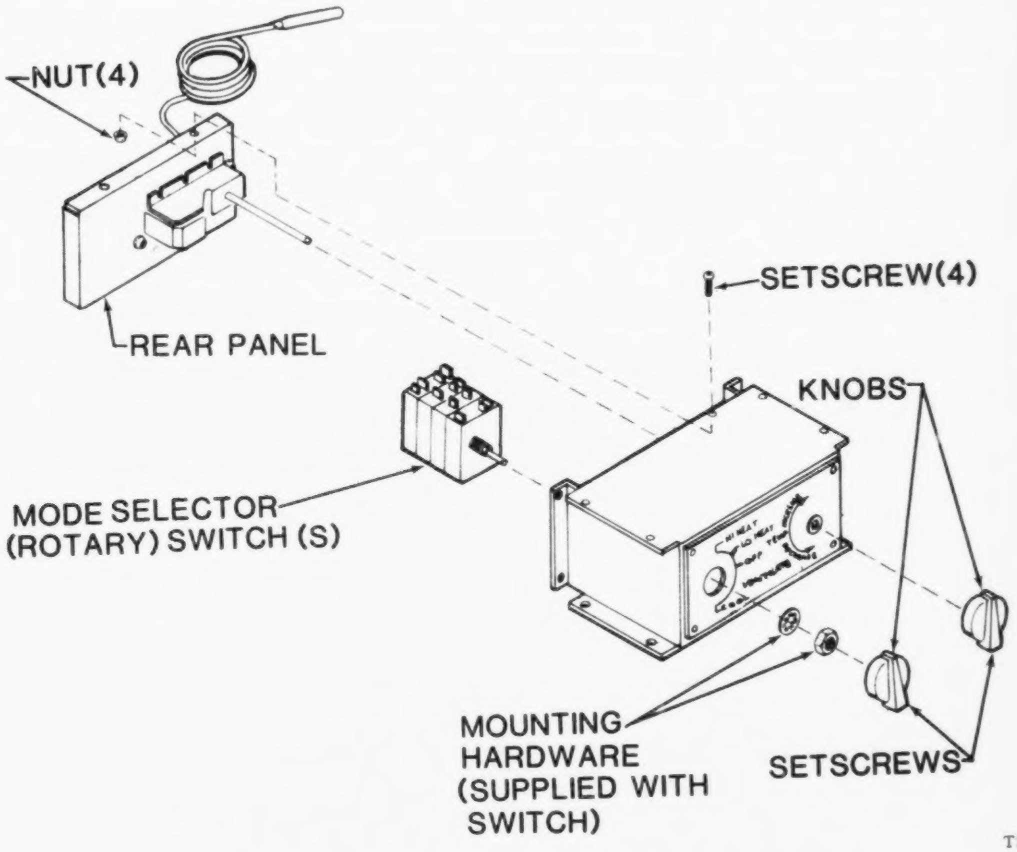
(6) Place TEMPerature control thermostat knob on shaft and aline setscrew with flat on shaft.

(7) Using allen wrench, tighten setscrew.

Follow-on procedure: Install control panel. (See para 4-36.)

4-39. MODE SELECTOR (ROTARY) SWITCH (S)

Preliminary procedure: Remove control panel. (See para 4-36.)


NUT(4)
REAR PANEL
SETSCREW(4)
KNOBS
MODE SELECTOR (ROTARY) SWITCH (S)
MOUNTING HARDWARE (SUPPLIED WITH SWITCH)
SETSCREWS

TS4120-370-14/4-51

Figure 4-51. Mode Selector (Rotary) Switch (S)

a. Access

(1) Using allen wrench, loosen setscrews in both knobs.

(2) Remove knobs.

(3) Using screwdriver and wrench, remove four screws and nuts that secure rear panel.

(4) Pull rear panel away from box as far as harness will allow.

(5) Using wrench and holding rear of mode selector switch, remove nut and lock washer from the shaft face.

b. Inspection

(1) Check switch to see that all leads are properly connected. (See wiring diagram, fig. 4-20.)

(2) Repair or replace all loose or broken leads.

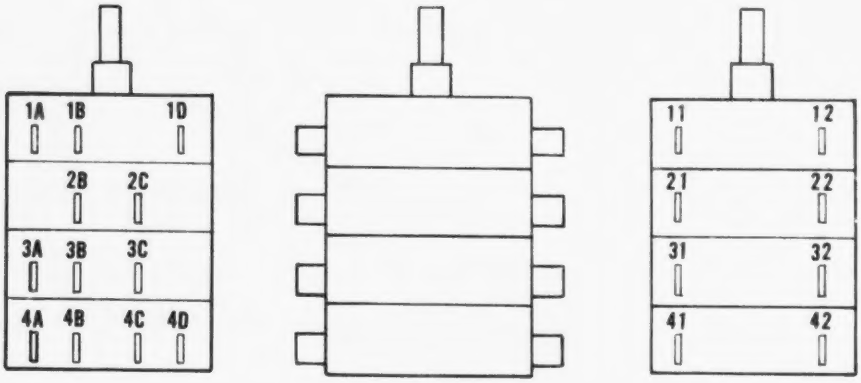
(3) Check that switch terminals are not loose, broken, or corroded.

(4) Check switch for evidence of overheating or other visible damage.

(5) Replace switch if damaged.

c. Test

(1) Using multimeter and switch position chart shown on figure 4-52, check continuity at contacts indicated. With switch position closed, continuity should be indicated. With switch position open, no continuity should be indicated. Check between each set of contacts and at each switch position.



		SWITCH POSITION				
	CONTACT NO.	1 HI HEAT	2 LO HEAT	3 OFF	4 VENT	5 COOL
S/WA	12 & 1A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	12 & 1B	OPEN	OPEN	OPEN	OPEN	CLOSED
	11 & 1D	OPEN	OPEN	OPEN	OPEN	CLOSED
S/WB	22 & 2B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
S/WC	32 & 3A	CLOSED	OPEN	OPEN	OPEN	OPEN
S/WD	42 & 4A	CLOSED	OPEN	OPEN	OPEN	OPEN
	41 & 4C	CLOSED	OPEN	OPEN	OPEN	OPEN

TS4120-370-14/4-52

Figure 4-52. Switch Position and Terminal Identification

(2) Replace switch if it fails above test.

d. Removal. (Assuming switch has been pulled from box for above test.)

(1) Tag and disconnect leads.

(2) Remove switch.

e. Installation

(1) See tags and wiring diagram, figure 4-20, and connect leads.

(2) Slip switch into control box and place shaft through hole.

(3) Using wrench and holding backside of switch, secure switch to box with lock washer and nut. Be sure that switch positions match front plate.

(4) Insert rear panel into box and aline holes.

(5) Using screwdriver and wrench, secure rear panel with four screws and nuts.

(6) Place knobs on switch shafts and aline setscrews with flats on shafts.

(7) Using allen wrench, tighten setscrews in both knobs.

Follow-on procedure: Install control panel. (See para 4-36.)

4-40. CONTROL PANEL HOUSING AND SUPPORT

Preliminary procedures:

1. Remove control panel wiring harness and electrical lead. (See para 4-37.)
2. Remove TEMPerature control thermostat. (See para 4-38.)
3. Remove mode selector switch. (See para 4-39.)

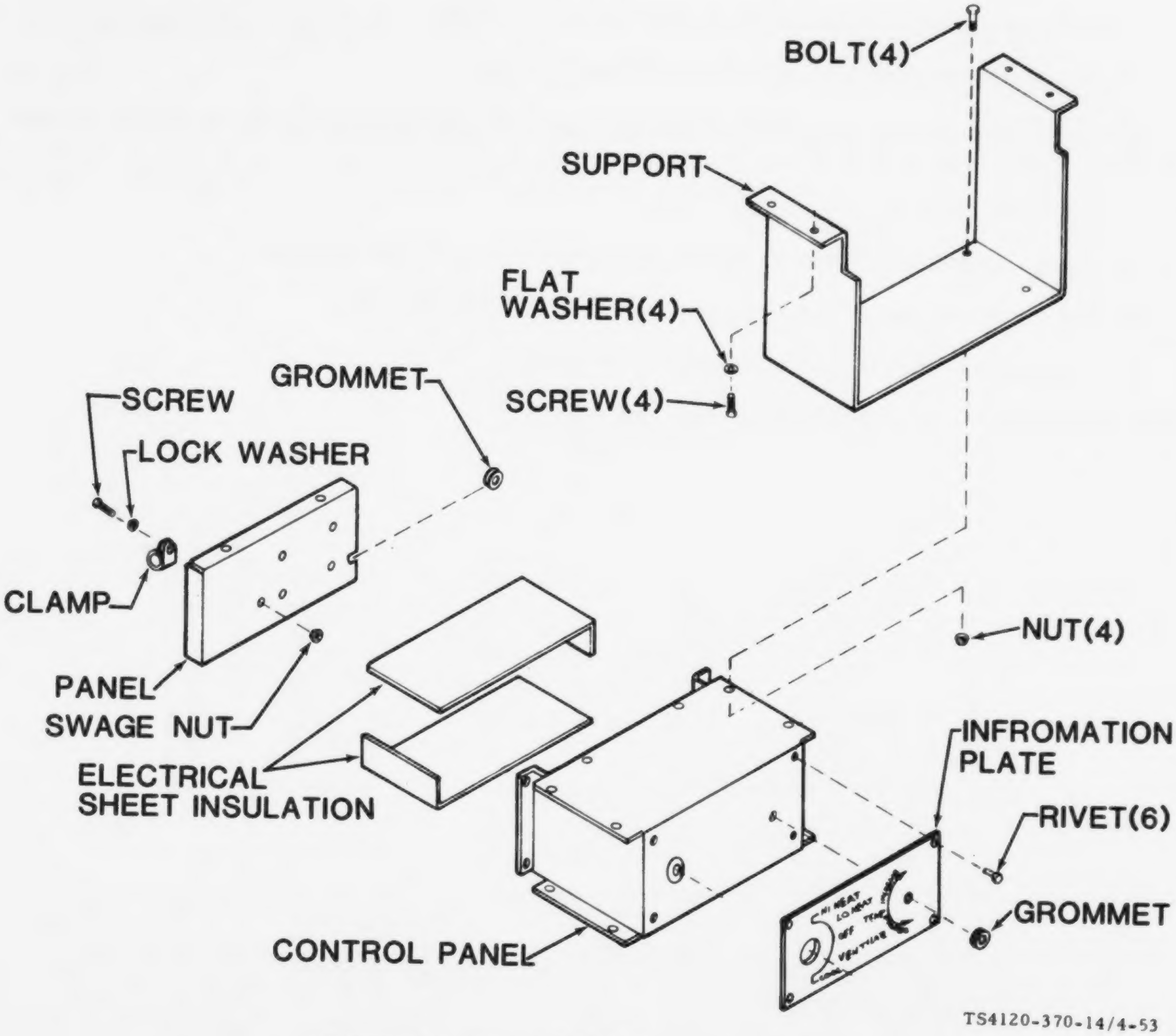

BOLT(4)
SUPPORT
FLAT WASHER(4)
SCREW(4)
GROMMET
SCREW
LOCK WASHER
CLAMP
PANEL
SWAGE NUT
ELECTRICAL SHEET INSULATION
NUT(4)
INFROMATION PLATE
RIVET(6)
GROMMET
CONTROL PANEL
TS4120-370-14/4-53

Figure 4-53. Control Panel Housing and Support

a. Inspection

(1) Check control panel for dents, cracks, or punctures. Replace if damage creates a hazard or interferes with operation.

(2) Check that insulation, swage nut, clamp, and grommets are in place and secure. Repair or replace as needed.

(3) Check that information plate is legible and securely riveted to control panel.

(4) Check support for cracks or dents that create a hazard or interfere with operation.

b. Repair

(1) Repairs are limited to replacement of damaged or missing parts and tightening of mounting hardware.

(2) Refer replacement of information plate to direct support maintenance.

Follow-on procedures:
1. Install mode selector switch. (See para 4-39.)
2. Install TEMPerature control thermostat. (See para 4-38.)
3. Install control panel wiring harness. (See para 4-37.)

4-41. BLOCK-OFF ASSEMBLY

This part is supplied only when specified on air conditioner ordering information.

NOTE

This paragraph is applicable only to units with remote mounted control panels. See paragraph 4-7, installation instructions, and your facility or shelter manual.

WARNING

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

Preliminary procedure: Turn unit power off at power source. If there is a chance that it will be turned on, also disconnect power cable to air conditioner.

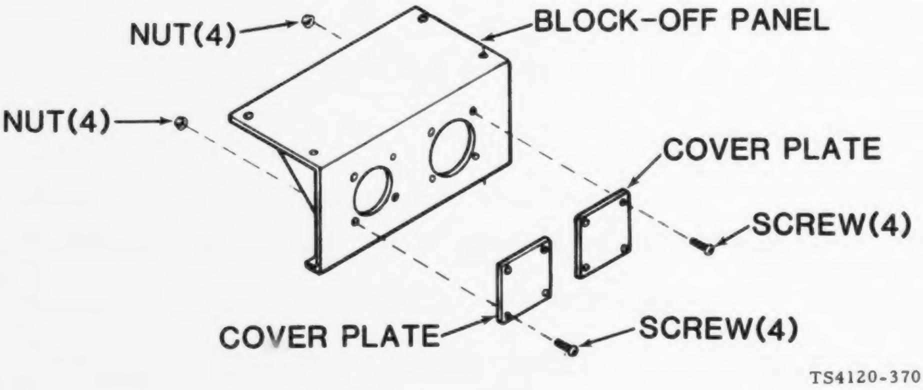
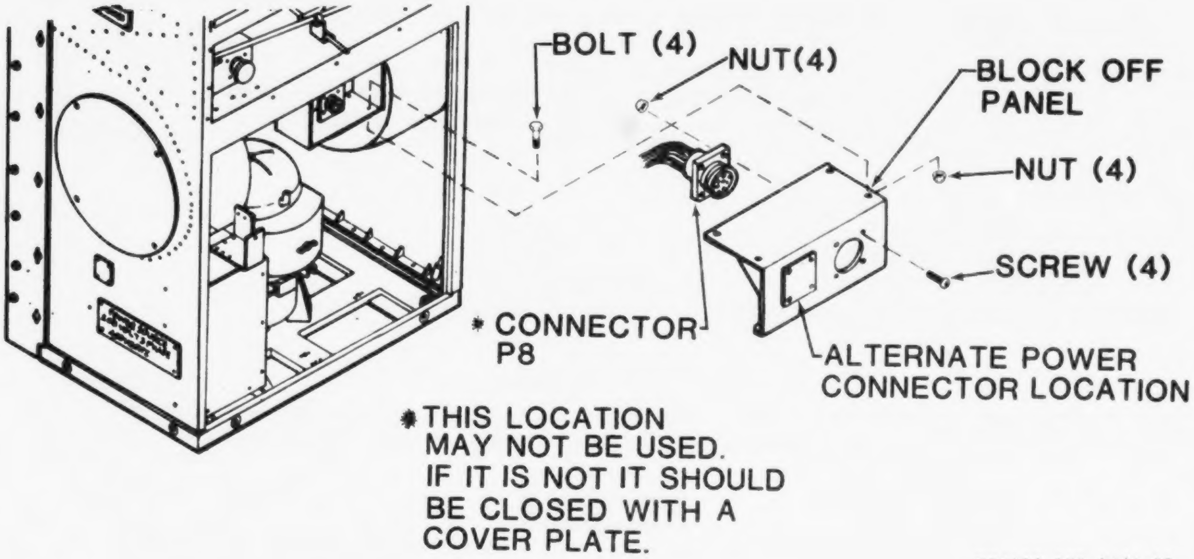


Figure 4-54. Block-Off Panel Prior to Installation

a. Removal

(1) Remove lower front panel. (See para 4-25.)

(2) If the P8 connector is installed, use a screwdriver and wrench to remove four screws and nuts from P8 connector.


BOLT (4)
NUT(4)
BLOCK OFF PANEL
NUT (4)
SCREW (4)
* CONNECTOR P8
ALTERNATE POWER CONNECTOR LOCATION
* THIS LOCATION MAY NOT BE USED. IF IT IS NOT IT SHOULD BE CLOSED WITH A COVER PLATE.

TS4120-370-14/4-55

Figure 4-55. Block-Off Panel Installed

(3) Pull connector from block-off panel.

(4) If alternate location for power connector was used, remove it also.

(5) Using two wrenches, remove four bolts and nuts from upper flanges.

(6) Remove block-off panel.

b. Inspection

(1) Check block-off for missing parts, loose hardware, and cracks or dents that would create a hazard or interfere with operation.

NOTE

If the alternate power and control connector locations in the conditioned air intake are used, both cover plates should be installed on block-off.

(2) Replace all missing or damaged parts.

c. Repair. Repairs are limited to replacement of missing or damaged parts.

d. Installation. (See installation instructions paragraph 4-7.)

(1) If applicable, use screwdriver and wrench to secure P8 connector and harness with four screws and nuts.

(2) If applicable install power connector in like manner.

(3) Using two wrenches, secure block-off to air conditioner with four bolts and nuts.

(4) Install lower front panel.

Follow-on procedure: Connect power.

4-42. WIRING HARNESSES

Preliminary procedures:
1. Remove top panel. (See para 4-24.)
2. Remove conditioned air filter. (See para 4-31.)
3. Remove lower front panel. (See para 4-25.)

a. Inspection/Test

(1) Check to be sure that power has been disconnected.

(2) Check connectors for general condition and loose, broken, or missing contacts. Replace damaged connectors.

(3) Check individual wires for loose solder connections, loose terminal lug connections, cut or frayed insulation, and cut or broken wires.

(4) See wiring diagram (fig. 4-20) and continuity test individual wires. Repair or replace wires with no continuity.

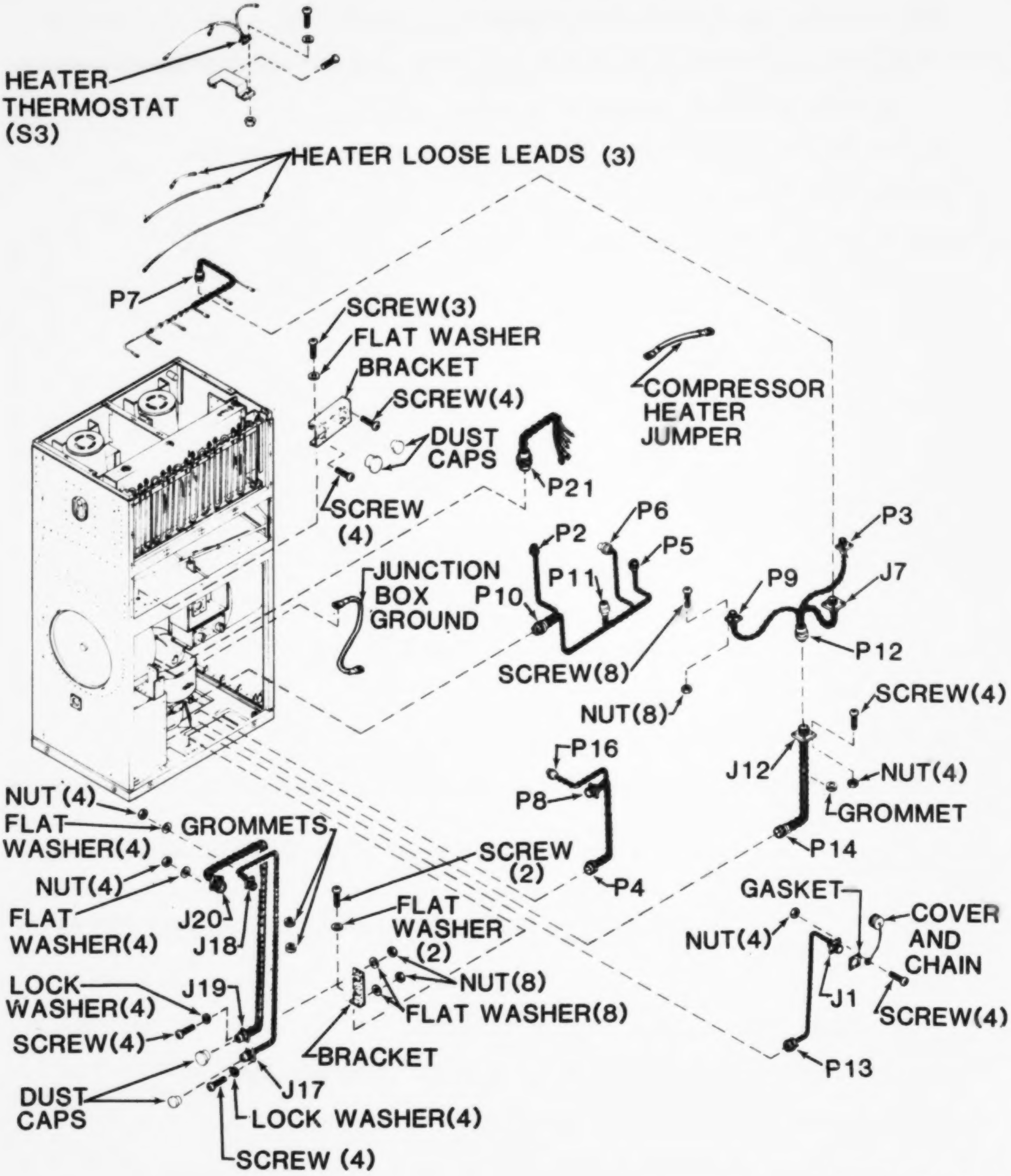
b. Repair

(1) See paragraph 4-35 for general wire repair instructions.

(2) See table 4-3 (Wire List) for wire lengths and terminal/connector information.

c. Removal/Installation. See figure 4-56 for removal/installation information.

Follow-on procedures:
1. Install front panel. (See para 4-25.)
2. Install conditioned air filter. (See para 4-31.)
3. Install top panel. (See para 4-24.)


HEATER THERMOSTAT (S3)
HEATER LOOSE LEADS (3)
P7
SCREW(3)
FLAT WASHER
BRACKET
SCREW(4)
DUST CAPS
COMPRESSOR HEATER JUMPER
P21
SCREW (4)
P2
P6
P5
P3
JUNCTION BOX GROUND
P10
P11
P9
J7
P12
SCREW(8)
NUT(8)
SCREW(4)
P16
J12
NUT(4)
P8
GROMMET
NUT (4)
FLAT WASHER(4)
GROMMETS
P14
SCREW (2)
NUT(4)
P4
FLAT WASHER(4)
J20
J18
FLAT WASHER (2)
GASKET
NUT(4)
COVER AND CHAIN
NUT(8)
LOCK WASHER(4)
J19
FLAT WASHER(8)
J1
SCREW(4)
SCREW(4)
BRACKET
P13
DUST CAPS
J17
LOCK WASHER(4)
SCREW (4)

TS4120-370-14/4-56

Figure 4-56. Wiring Harnesses

4-43. JUNCTION BOX

This junction box is the protective enclosure that contains the compressor circuit breaker (CB1), relays (K1, K7, K8, K9, and K10), time delay relay (K6), and terminal blocks (TB1 and TB2). The filter assembly (A1) and the transformer (T) are mounted on the outside rear of the junction box.

See the following paragraphs for maintenance of junction box and internal items:

- Junction box removal/installation (See para 4-44.)
- Junction box access to internal components (See para 4-45.)
- Junction box harnesses and leads (See para 4-46.)
- RFI (Radio Frequency Interference) filter (A1) (See para 4-47.)
- Compressor circuit breaker (CB1) (See para 4-48.)
- Time delay relay (K6) (See para 4-49.)
- Transformer (T) (See para 4-50.)
- Control relay (K10) (See para 4-51.)
- Heater relay (K1) (See para 4-52.)
- Condenser fan motor relay (K7) (See para 4-53.)
- Evaporator fan motor relay (K8) (See para 4-54.)
- Compressor relay (K9) (See para 4-55.)
- Terminal boards (TB1 and TB2) (See para 4-56.)
- Junction box housing and cover (See para 4-57.)

4-44. JUNCTION BOX REMOVAL/INSTALLATION

WARNING

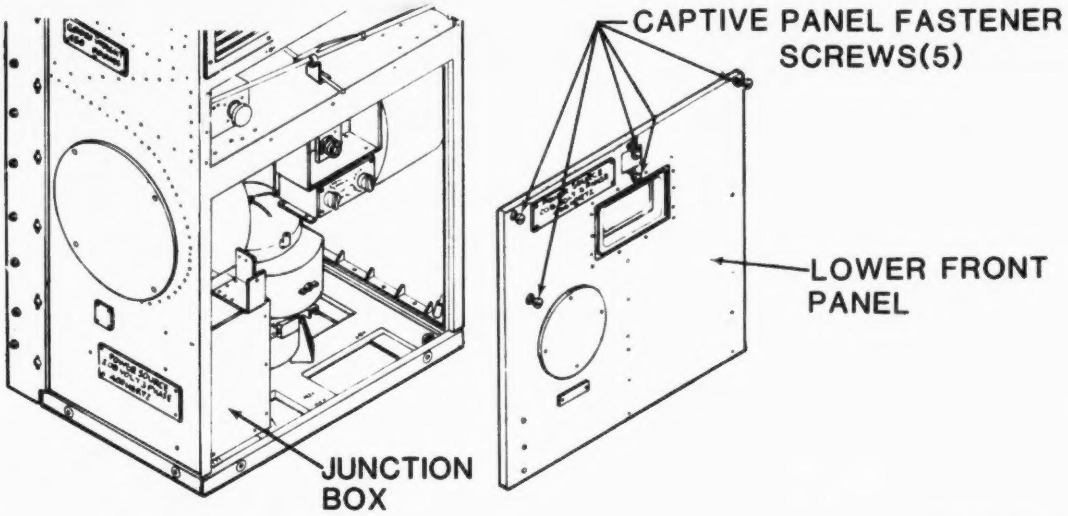
Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

a. Removal

(1) Turn power off at power source.

(2) Disconnect power cable at air conditioner.

(3) Using screwdriver, loosen five captive panel fasteners in lower front panel.



TS4120-370-14/4-57

Figure 4-57. Lower Front Panel Removal

(4) Tilt top of lower front panel out and lift panel up to remove.

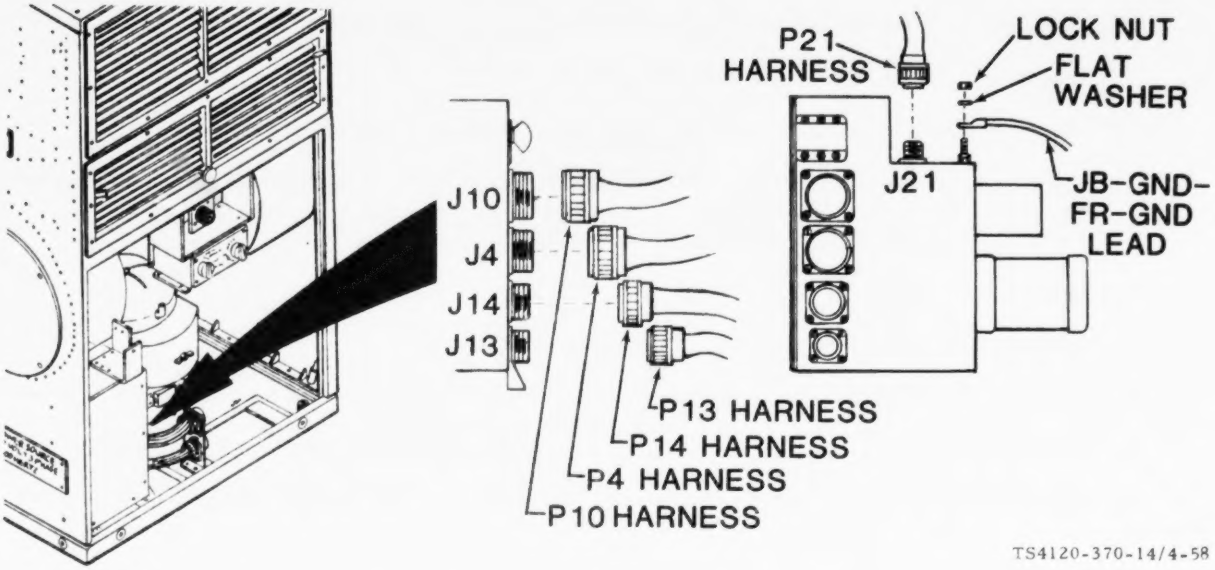
(5) Disconnect P10, P4, P14, P13, and P21 harness connectors.

(6) Using screwdriver and wrench, remove two screws, lock washers, and nuts from circuit breaker push-pull control wire clamp.

(7) Remove clamp and spacer plate.

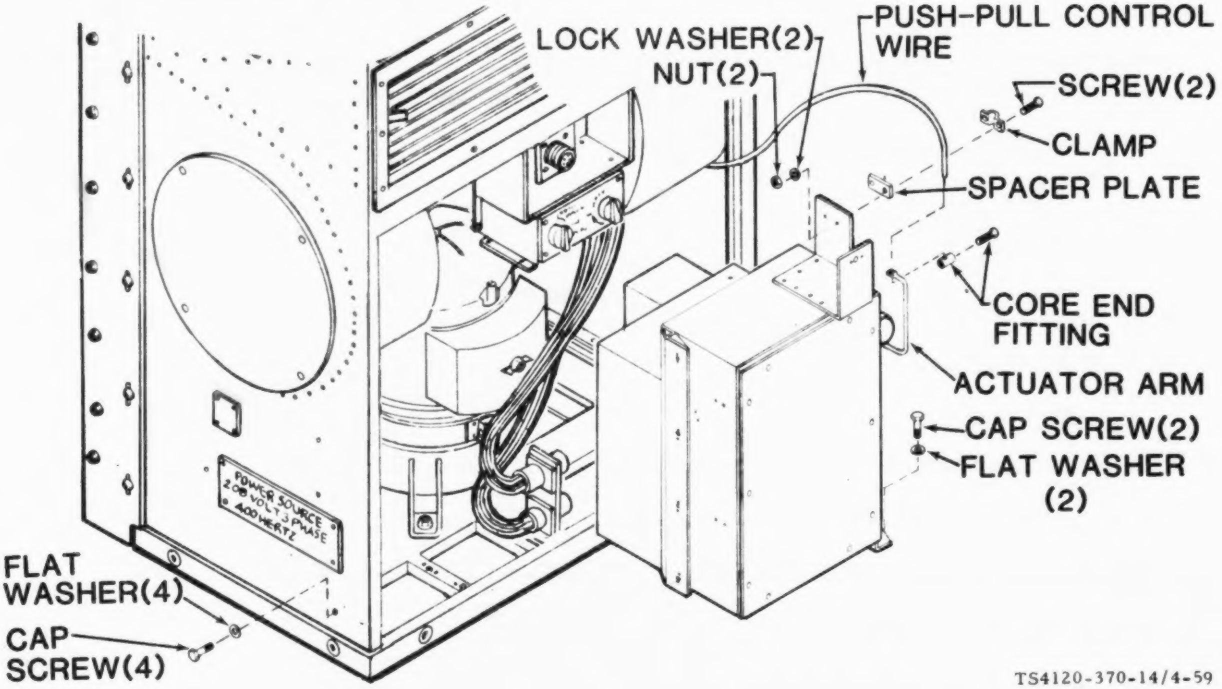
(8) Loosen screw in core end fitting and remove core end fitting.

(9) Pull push-pull control wire end free of actuator arm.


P21 HARNESS
LOCK NUT
FLAT WASHER
J21
JB-GND-FR-GND LEAD
J10
J4
J14
J13
P13 HARNESS
P14 HARNESS
P4 HARNESS
P10 HARNESS

TS4120-370-14/4-58

Figure 4-58. Junction Box Harness and Lead Disconnect


LOCK WASHER(2)
NUT(2)
PUSH-PULL CONTROL WIRE
SCREW(2)
CLAMP
SPACER PLATE
CORE END FITTING
ACTUATOR ARM
CAP SCREW(2)
FLAT WASHER (2)
POWER SOURCE 208 VOLT 3 PHASE 400 HERTZ
FLAT WASHER(4)
CAP SCREW(4)

TS4120-370-14/4-59

Figure 4-59. Junction Box Removal/Installation

(10) Using wrench, remove lock nut and flat washer from ground wire lead.

(11) Disconnect JB-GND—FR-GND lead from junction box.

(12) Using wrench, remove four cap screws and flat washers from side of junction box.

(13) Using wrench, remove two cap screws and flat washers from lower right junction box mounting foot.

(14) Carefully lift junction box up and out of air conditioner.

b. Installation

(1) Place junction box in air conditioner and aline mounting holes.

(2) Using wrench, secure junction box lower right mounting foot with two cap screws and flat washers.

(3) Using wrench, secure junction box to left side panel with four cap screws and flat washers.

(4) Place JB-GND—FR-GND lead on junction box ground stud. Using wrench, secure with flat washer and nut.

(5) Check that circuit breaker reset knob on rear of air conditioner is pushed in all the way.

(6) Insert push-pull control wire end through hole in top of actuator arm.

(7) Slip core end fitting on push-pull control wire end and use screwdriver to tighten screw.

(8) Flip circuit breaker to OFF (down) position.

(9) Using screwdriver and wrench, secure push-pull control wire casing with spacer plate, clamp, and two screws, lock washers, and nuts.

(10) Check that circuit breaker is turned on when knob on rear of air conditioner is pulled out and pushed in. Pushing knob in should not turn circuit breaker off.

(11) Connect the following harness connectors:

P21 to J21

P13 to J13

P14 to J14

P4 to J4

P10 to J10

(12) Insert bottom flange of lower front panel inside the lip of the cabinet base.

(13) Push top of lower front panel into position.

(14) Using screwdriver, secure lower front panel with five captive panel screws.

(15) Connect power cable.

(16) Turn on power at power source.

4-45. JUNCTION BOX ACCESS TO INTERNAL COMPONENTS

WARNING

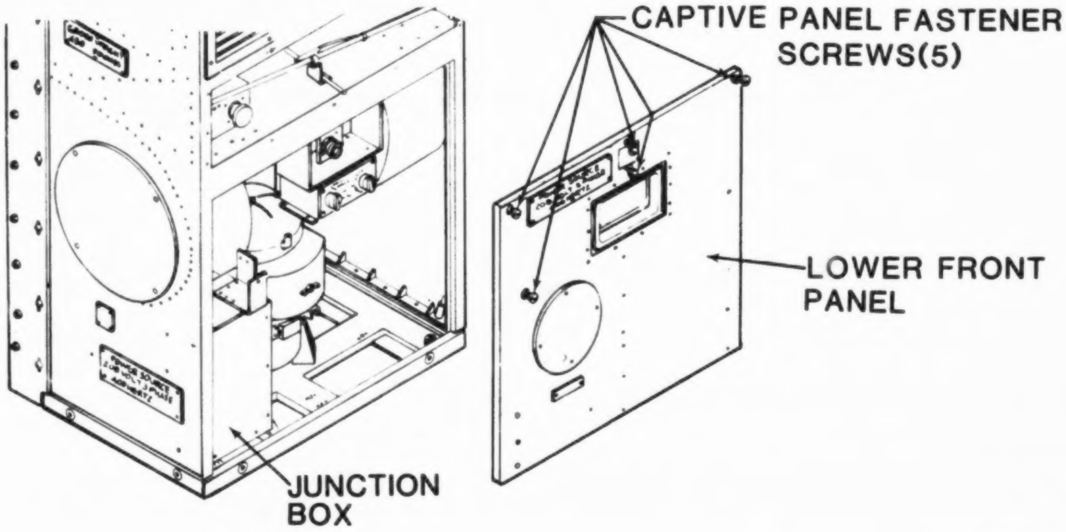
Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

a. Access

(1) Turn power off at power source.

(2) Disconnect power cable at air conditioner.

(3) Using screwdriver, loosen five captive panel fasteners in lower front panel.

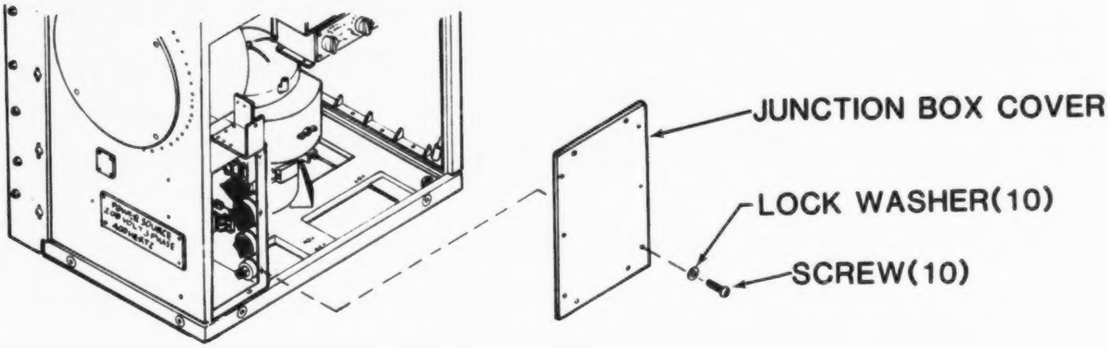

CAPTIVE PANEL FASTENER SCREWS(5)
LOWER FRONT PANEL
JUNCTION BOX

TS4120-370-14/4-60

Figure 4-60. Lower Front Panel Removal

(4) Tilt top of lower front panel out and lift panel up to remove.

(5) Using screwdriver, remove ten screws and lock washers from junction box cover.



TS4120-370-14/4-61

Figure 4-61. Junction Box Cover

(6) Remove junction box cover.

b. Reassemble

(1) Place junction box cover on box and aline holes.

(2) Using screwdriver, secure junction box cover with ten screws and lock washers.

(3) Insert bottom flange of lower front panel inside the lip of the cabinet base.

(4) Push top of lower front panel into position.

(5) Using screwdriver, secure lower front panel with five captive panel screws.

(6) Connect power cable.

(7) Turn on power at power source.

4-46. JUNCTION BOX HARNESSES AND LEADS

Preliminary procedure: Remove junction box. (See para 4-44.)

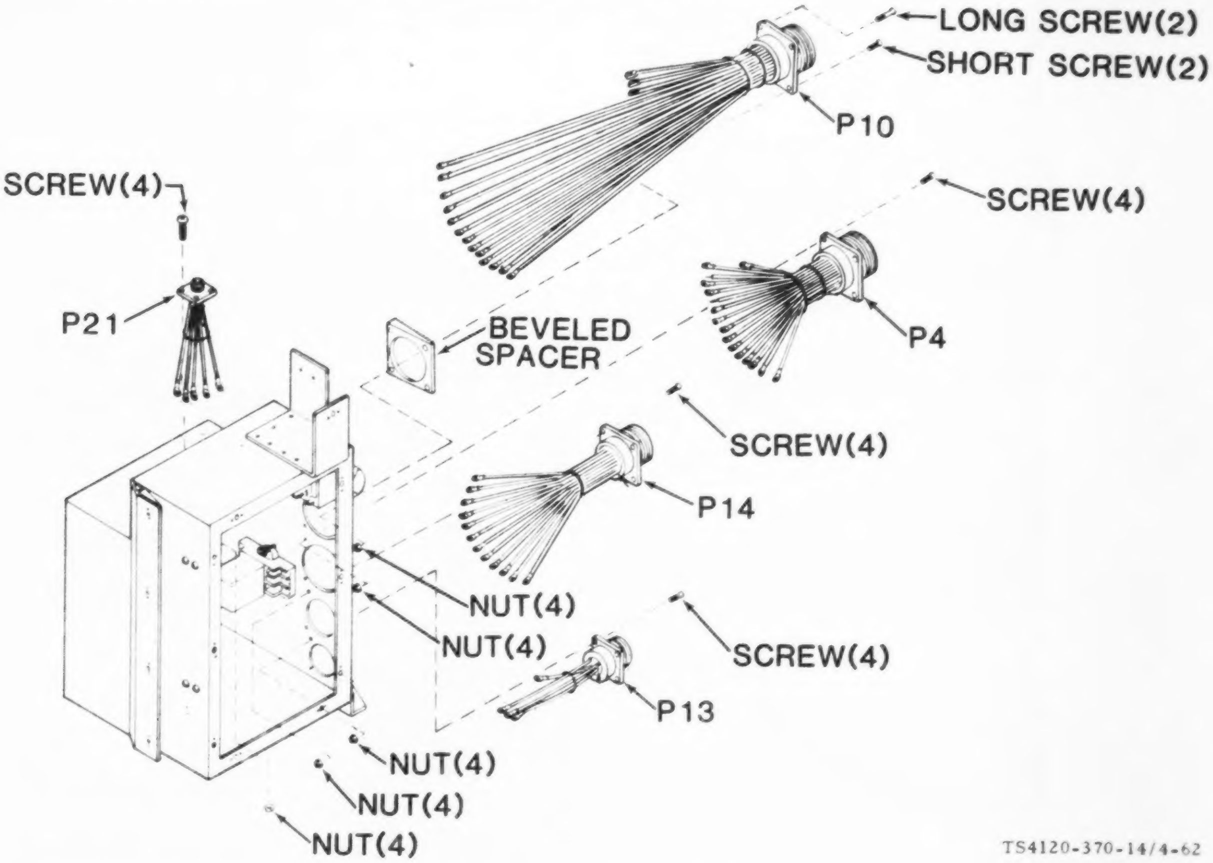

LONG SCREW(2)
SHORT SCREW(2)
P10
SCREW(4)
SCREW(4)
P21
BEVELED SPACER
P4
SCREW(4)
P14
NUT(4)
NUT(4)
SCREW(4)
P13
NUT(4)
NUT(4)
NUT(4)
TS4120-370-14/4-62

Figure 4-62. Junction Box Harnesses

a. Inspection/Test

(1) Check connectors for general condition and loose, broken, or missing contacts. Replace damaged connectors.

(2) Check individual wires for loose solder connections, loose terminal lug connections, cut or frayed insulation, and cut or broken wires.

(3) See wiring diagram (fig. 4-20) and continuity test individual wires. Repair or replace wires with no continuity.

b. Repair

(1) See paragraph 4-35 for general wire repair instructions.

(2) See table 4-3 (Wire List) for wire lengths and terminal/connector information.

c. Removal/Installation. See figure 4-62 for removal/installation information.

Follow-on procedure: Install junction box. (See para 4-44.)

4-47. RFI (RADIO FREQUENCY INTERFERENCE) FILTER (A1)

Preliminary procedure: Remove junction box. (See para 4-44.)

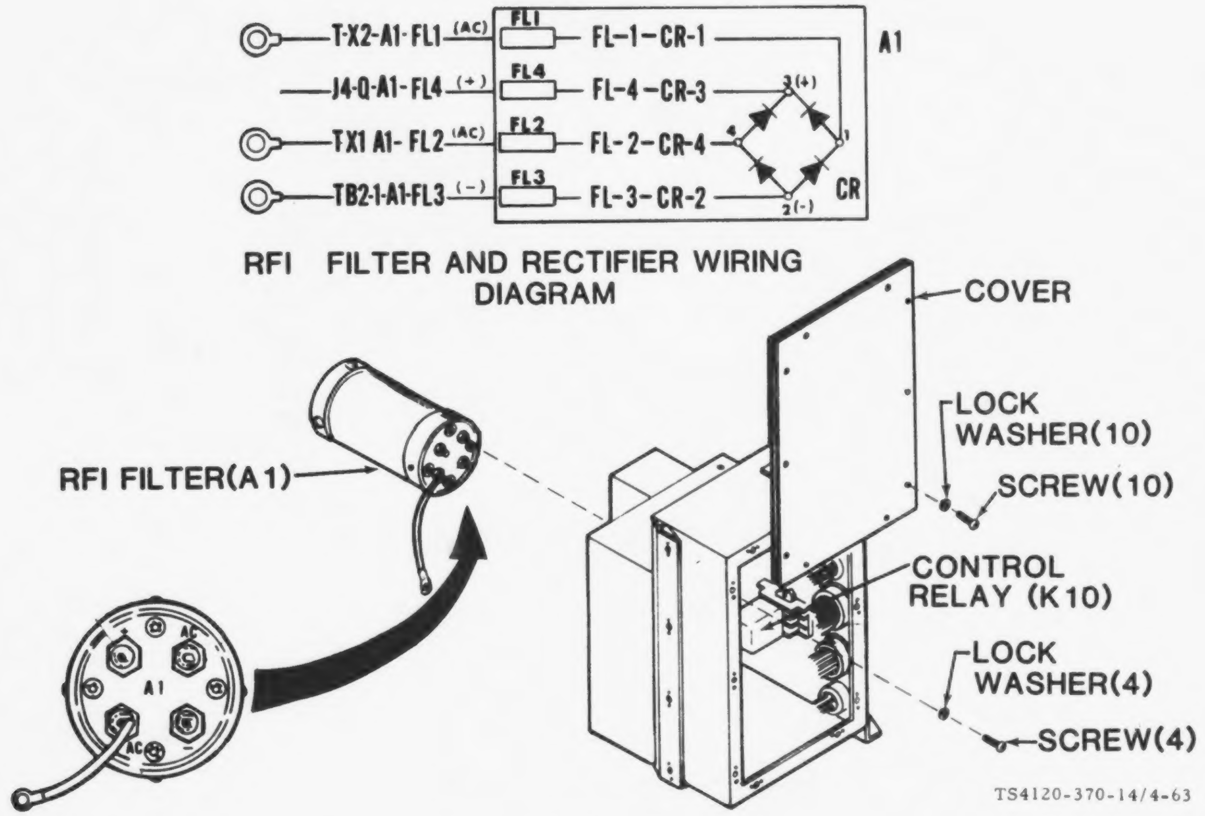

T-X2-A1-FL1
(AC)
FL1
FL-1-CR-1
A1
J4-Q-A1-FL4
(+)
FL4
FL-4-CR-3
3(+)
T-X1 A1-FL2
(AC)
FL2
FL-2-CR-4
4
1
TB2-1-A1-FL3
(-)
FL3
FL-3-CR-2
2(-)
CR
RFI FILTER AND RECTIFIER WIRING DIAGRAM
COVER
LOCK WASHER(10)
SCREW(10)
RFI FILTER(A1)
CONTROL RELAY (K10)
LOCK WASHER(4)
SCREW(4)
+
AC
A1
AC
-
TS4120-370-14/4-63

Figure 4-63. RFI Filter (A1)

a. Removal

(1) Using screwdriver, remove ten screws and lock washers from junction box cover.

(2) Remove cover.

(3) Release hold down springs and remove pull control relay (K10) from socket.

(4) Tag and disconnect wire lead from transformer terminal X2.

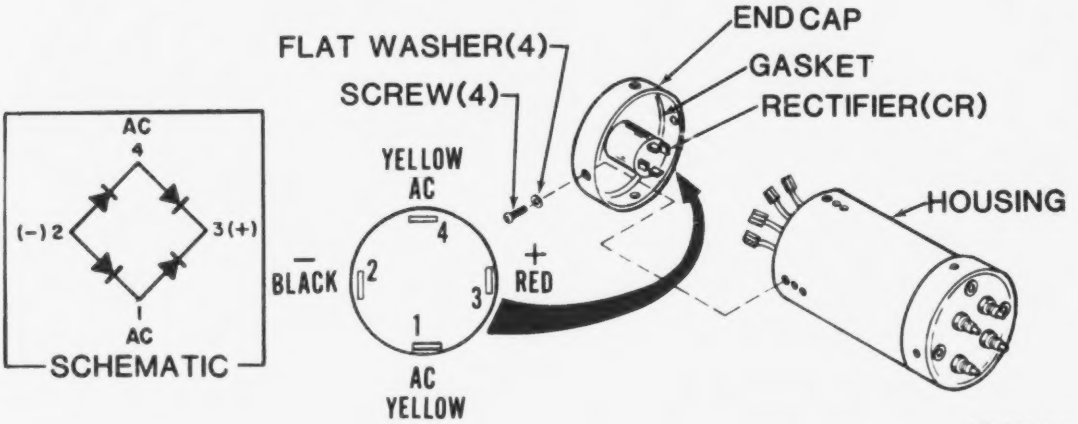
(5) Using screwdriver, remove four screws and lock washers that secure RFI filter from inside of junction box.

(6) Tag and unsolder electrical leads.

(7) Carefully slip RFI filter assembly (A1) away from box as far as wires will allow.

b. Inspection/Test

(1) Check that tube type housing is not damaged.



TS4120-370-14/4-64

Figure 4-64. Rectifier (CR)

(2) Using screwdriver, remove four screws and flat washers from end cap.

(3) Pull end cap away from tube.

(4) Tag and disconnect four leads from rectifier (CR).

(5) Check wire leads for loose connections to filters.

(6) Check wire leads for cut or frayed insulation and cut or broken wires.

(7) Use a continuity tester or a multimeter set on the lowest OHMS scale to test each RFI filter. If continuity is not found, replace the affected filter.

(8) Use a continuity tester or a multimeter set on the lowest OHMS scale to test between each filter lead and the case. If continuity is found between any lead and the case, replace the affected filter.

(9) Use a continuity tester or a multimeter set on the lowest OHMS scale to test for continuity between each of the four rectifier terminals and the cap. If continuity is found between any rectifier terminal and end cap, replace rectifier.

(10) Use a multimeter set on lowest OHMS scale to test resistance across rectifier bridge in accordance with the following table. If resistance is different from that indicated in table, replace rectifier.

Table 4-4. Rectifier Test

Meter Lead Neg	 Pos	Resistance
Term. 1	Term. 2	20 ohms or less
Term. 1	Term. 3	1000 ohms or more
Term. 2	Term. 1	1000 ohms or more
Term. 2	Term. 4	1000 ohms or more
Term. 4	Term. 2	20 ohms or less
Term. 4	Term. 3	1000 ohms or more
Term. 3	Term. 1	20 ohms or less
Term. 3	Term. 4	20 ohms or less
Term. 1	Term. 4	1000 ohms or more
Term. 4	Term. 1	1000 ohms or more
Term. 2	Term. 3	1000 ohms or more
Term. 3	Term. 2	80 ohms or less

NOTE

A diode bridge will sometimes act differently under a power test than resistance tests indicate. To perform a power test, apply 28 volts ac across terminals 1 and 4 and use a dc voltmeter with negative probe on terminal 2 and positive probe on terminal 3 to test output voltage. The meter should read 24 ± 5 volts. If output voltage is not within limits, replace rectifier.

(11) Check gasket in end cap for general condition. Replace if damaged.

(12) Reassemble by attaching four filter leads to the correct rectifier terminals, slip end cap of tube, and install four screws and washers.

c. Disassembly

(1) Using screwdriver, remove four screws and flat washers from end cap.

(2) Pull end cap away from tube.

(3) Tag and disconnect four leads from rectifier (CR).

(4) Using wrench, remove nut, lock washer, and flat washer from rectifier stud.

(5) Remove rectifier.

(6) Using wrench, loosen and remove nut and lock washer from each of the four filters.

(7) Remove filters.

d. Reassembly

(1) If a new filter is being installed, solder wire leads in place and install terminals.

(2) Insert filter into tube assembly and secure filter with nut and lock washer.

(3) Insert rectifier mounting stud through hole in end cap and secure with nut, lock washer, and flat washer.

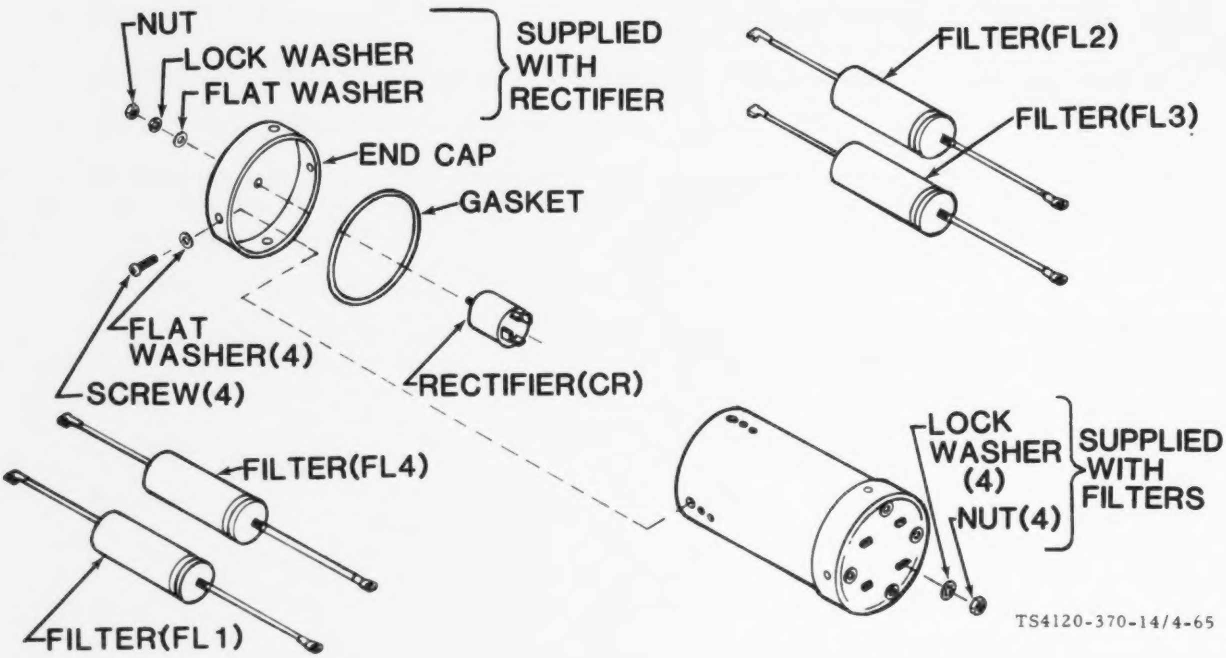

NUT
LOCK WASHER
FLAT WASHER
SUPPLIED WITH RECTIFIER
END CAP
GASKET
FLAT WASHER(4)
SCREW(4)
RECTIFIER(CR)
FILTER(FL2)
FILTER(FL3)
FILTER(FL4)
FILTER(FL1)
LOCK WASHER (4)
NUT(4)
SUPPLIED WITH FILTERS
TS4120-370-14/4-65

Figure 4-65. RFI Filter (A1) Assembly/Disassembly

(4) Place gasket into end cap.

(5) Connect wire leads using tag and wiring diagram. (See fig. 4-63.)

(6) Secure end cap to tube with four screws and washers.

e. Installation

(1) Using tags and wiring diagram (fig. 4-20) solder leads to RFI filter assembly.

(2) Place RFI filter assembly onto junction box with wire leads extending into box.

(3) Using screwdriver, secure RFI filter assembly with four screws and lock washers.

(4) Connect lead to transformer terminal X2 using tag and wiring diagram. (See fig. 4-20.)

(5) Remove tags.

(6) Aline control relay and socket contacts and push relay firmly into socket and hold down springs.

(7) Using screwdriver, secure junction box cover with ten screws and lock washers.

Follow-on procedure: Install junction box. (See para 4-44.)

4-48. COMPRESSOR CIRCUIT BREAKER (CB1)

Preliminary procedure: Remove junction box cover. (See para 4-45.)

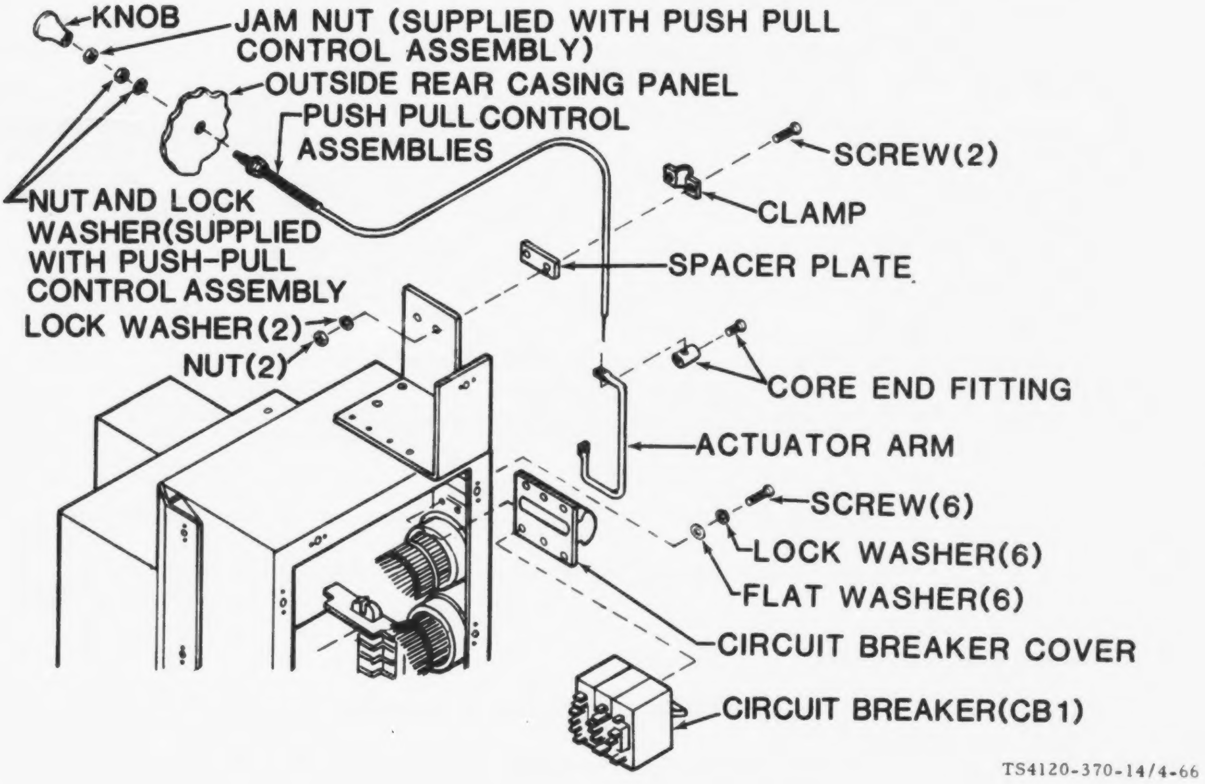

KNOB
JAM NUT (SUPPLIED WITH PUSH PULL CONTROL ASSEMBLY)
OUTSIDE REAR CASING PANEL
PUSH PULL CONTROL ASSEMBLIES
SCREW(2)
CLAMP
NUT AND LOCK WASHER(SUPPLIED WITH PUSH-PULL CONTROL ASSEMBLY
SPACER PLATE
LOCK WASHER(2)
NUT(2)
CORE END FITTING
ACTUATOR ARM
SCREW(6)
LOCK WASHER(6)
FLAT WASHER(6)
CIRCUIT BREAKER COVER
CIRCUIT BREAKER(CB1)
TS4120-370-14/4-66

Figure 4-66. Compressor Circuit Breaker (CB1)

a. Inspection

(1) Check that mounting hardware on push-pull (reset) control and circuit breaker is in place and secure.

(2) Check that wire leads are properly connected to circuit breaker and are not damaged.

(3) Check circuit breaker for signs of overheating or other visible damage.

b. Test

(1) Disconnect P10, P4, P14, P13, and P21 junction box connectors.

(2) Set circuit breaker reset bar in OFF position.

(3) Use multimeter set on lowest OHMS scale to check continuity between terminals A1 and A2, B1 and B2, C1 and C2, and auxiliary switch terminals C and NO. All contacts should be open. If there is continuity on any check, replace circuit breaker.

(4) Press reset bar toward the OFF stop, then place it in the ON position.

(5) Use a multimeter set on the lowest OHMS scale and repeat continuity checks between terminals A1 and A2, B1 and B2, C1 and C2, and auxiliary switch terminals C and NO. All four contacts should be closed. If there is no continuity on any check, replace circuit breaker.

(6) Reconnect P10, P4, P14, P13, and P21 junction box connectors.

c. Removal

(1) Tag and disconnect wire leads.

(2) Using screwdriver, remove six screws, lock washers, and flat washers.

(3) Using pliers, pull shaft that holds reset toggles together and disconnect reset actuator arm.

(4) Remove circuit breaker and circuit breaker cover.

NOTE

If circuit breaker push-pull reset control is not being removed, skip following steps.

(5) Using screwdriver, loosen screw in core end fitting and remove it from wire end.

(6) Remove actuator arm.

(7) Remove knob, jam nut, nut, and lock washer from rear of unit.

(8) Using screwdriver, remove two screws, lock washer, and nuts from push-pull clamp and spacer on junction box mounting angle.

(9) Remove clamp and spacer.

(10) Remove push-pull control assembly.

d. Installation

NOTE

If push-pull reset control was not removed, skip control installation steps.

(1) Slip knob connection end of push-pull control assembly through hole in outside rear casing panel.

(2) Using wrench, secure push-pull control to outside rear casing panel with a nut and lock washer.

(3) Install jam nut and knob.

(4) Using pliers, pull shaft that holds reset toggles together on circuit breaker.

(5) Place actuator arm into position and reinsert reset toggle shaft.

(6) Using screwdriver, install circuit breaker and circuit breaker cover with six screws, lock washers, and flat washers.

(7) Check that circuit breaker reset knob on rear of air conditioner is pushed in all the way.

(8) Insert push-pull control wire end through hole in top of actuator arm.

(9) Slip core end fitting on push-pull control wire end and use screwdriver to tighten screw.

(10) Flip circuit breaker to OFF (down) position.

(11) Using screwdriver and wrench, secure push-pull control wire casing with spacer plate, clamp, and two screws, lock washers, and nuts.

(12) Check that circuit breaker is turned on when knob on rear of air conditioner is pulled out and pushed in. Pushing knob in should not turn circuit breaker off.

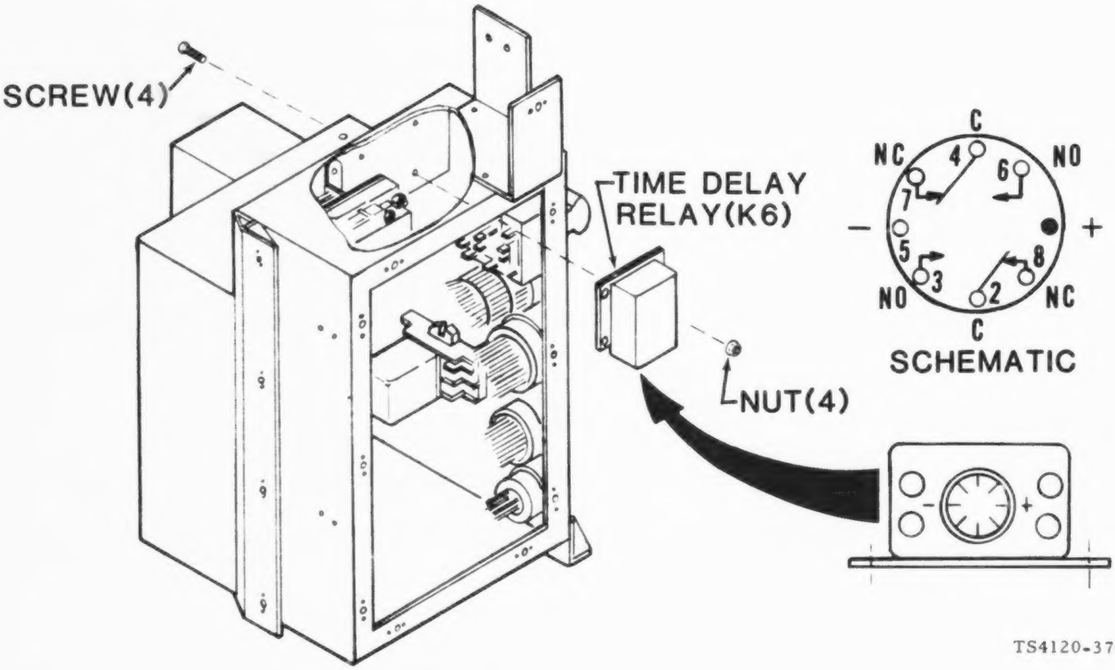
(13) Using tags and wiring diagram (fig. 4-20) connect leads.

(14) Remove tags.

Follow-on procedure: Install junction box cover and lower front panel. (See para 4-45.)

4-49. TIME DELAY RELAY (K6)

Preliminary procedure: Remove lower front panel and junction box cover. (See para 4-45.)


SCREW(4)
TIME DELAY RELAY(K6)
NUT(4)
C
NC
4
6
NO
7
−
+
5
8
3
2
NO
NC
C
SCHEMATIC
−
+

TS4120-370-14/4-67

Figure 4-67. Time Delay Relay (K6)

a. Inspection

(1) Check for loose solder connections.

(2) Check for cracks, evidence of overheating, and other visible damage. Replace if damaged.

b. Removal

(1) Tag and unsolder wire leads.

(2) Using screwdriver and wrench, remove four screws and nuts from time delay relay.

(3) Remove time delay relay.

c. Test

(1) Using a multimeter, check continuity.

- Terminal 1 (identified as + on relay) — Continuity should be indicated
- Terminal 2 to 3 — Continuity should not be indicated
- Terminal 4 to 6 — Continuity should not be indicated

(2) Apply 24 volts dc to terminals 1 (+) and 5 (–) and check continuity across terminals 2 and 3 and terminals 4 and 6. After a 30 second time delay continuity should be indicated.

(3) Replace time delay relay if it fails any of the above tests.

d. Installation

(1) Using screwdriver and wrench, secure time delay relay to junction box with four screws and nuts.

(2) Slip heat shrinkable insulation tubing on leads.

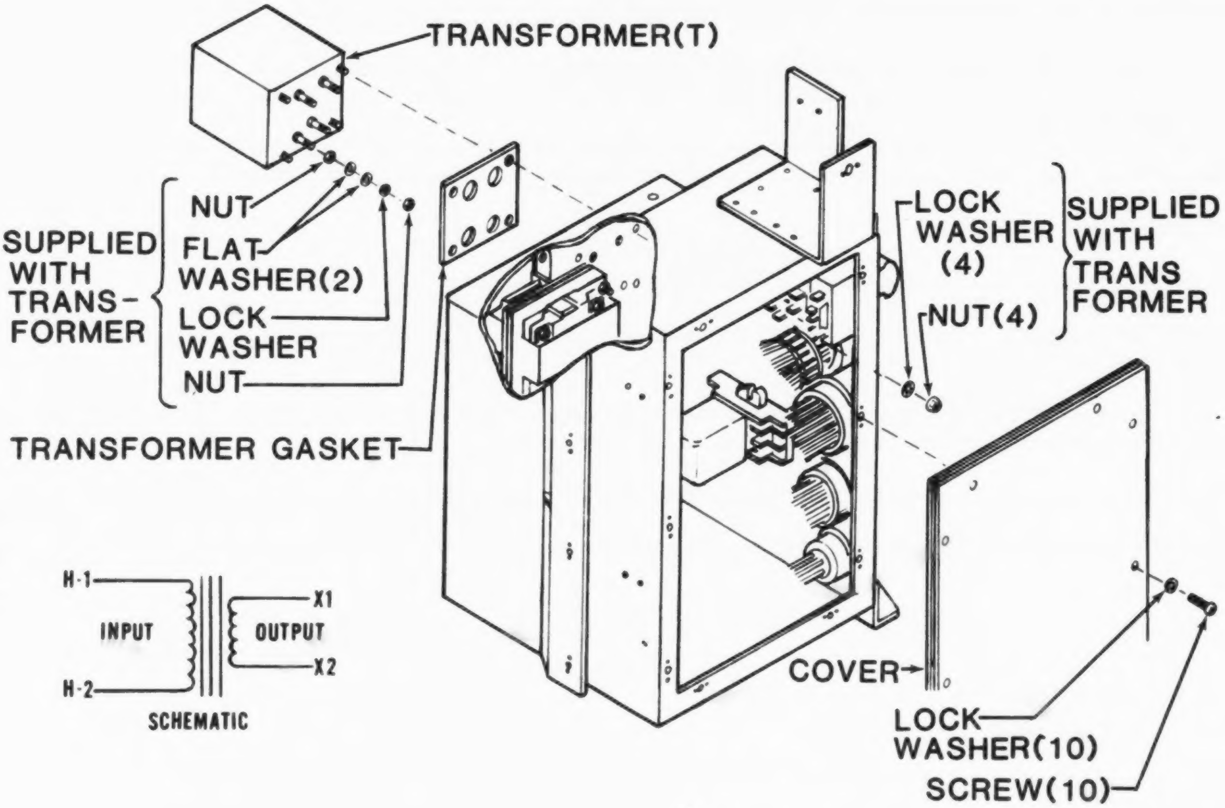
(3) See tags and wiring diagram (fig. 4-20) and solder leads.

(4) Slip heat shrinkable tubing over exposed solder connections, bare terminals, and shrink in place.

Follow-on procedure: Install junction box cover and lower front cover. (See para 4-45.)

4-50. TRANSFORMER (T)

Preliminary procedure: Remove junction box. (See para 4-44.)


TRANSFORMER(T)
SUPPLIED WITH TRANS-FORMER
NUT
FLAT WASHER(2)
LOCK WASHER
NUT
TRANSFORMER GASKET
LOCK WASHER (4)
NUT(4)
SUPPLIED WITH TRANS FORMER
COVER
LOCK WASHER(10)
SCREW(10)
H-1
H-2
INPUT
OUTPUT
X1
X2
SCHEMATIC

TS4120-370-14/4-68

Figure 4-68. Transformer (T)

a. Removal

(1) Using a screwdriver, remove ten screws and lock washers from junction box cover.

(2) Remove cover.

(3) Tag and disconnect wire leads.

(4) Using wrench, remove four nuts and lock washers from transformer mounting studs.

(5) Remove transformer and gasket.

b. Test

(1) Connect the probes of a continuity tester or a multimeter set on the lowest OHMS scale to terminal studs H1 and H2. If the primary winding is open, replace the transformer.

(2) Connect the probes of a continuity tester or a multimeter set on the lowest OHMS scale to terminal studs X1 and X2. If the secondary winding is open, replace the transformer.

(3) Connect one probe of a multimeter set on high OHMS scale to either terminal stud H1 or H2 and the other probe to the transformer case. If resistance is less than 500,000 ohms, replace the transformer.

(4) Connect one probe of a multimeter set on high OHMS scale to either terminal stud X1 or X2 and the other probe to the transformer case. If resistance is less than 500,000 ohms, replace the transformer.

(5) Connect one probe of a multimeter set on high OHMS scale to either terminal stud H1 or H2 and the other probe to either terminal stud X1 or X2. If resistance is less than 500,000 ohms, replace the transformer.

c. Installation

(1) Position transformer and gasket on outside rear of junction box.

(2) Using wrench, secure transformer with four nuts and lock washers. Torque shall not exceed 5 inch pounds.

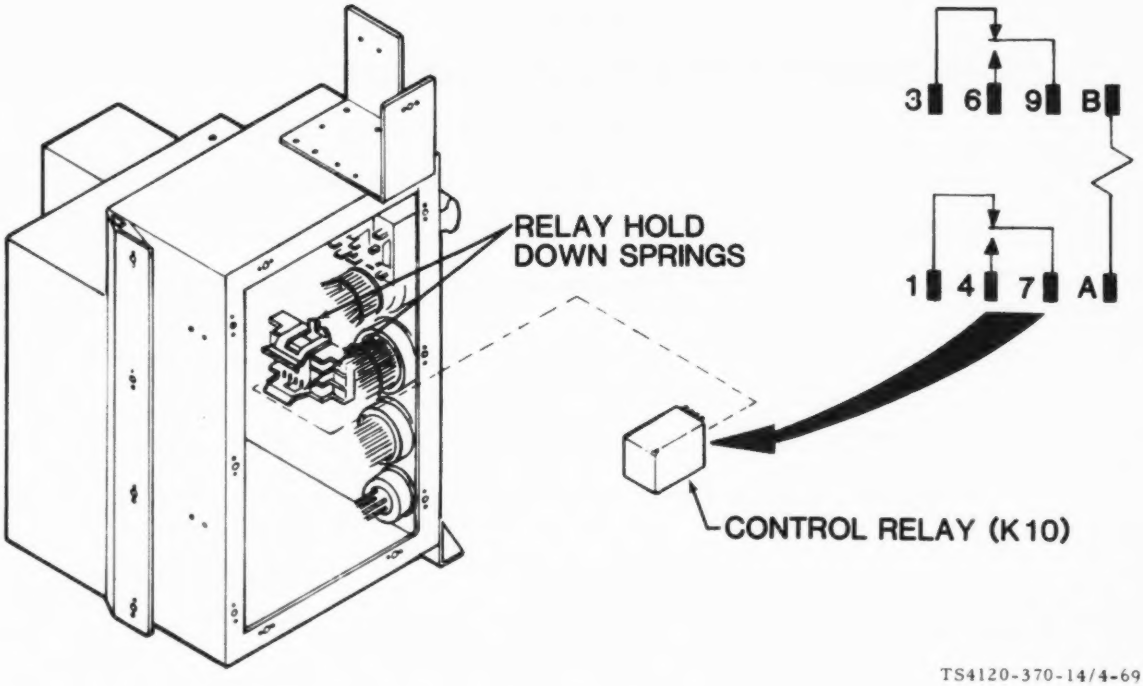
(3) See tags and wiring diagram (fig. 4-20) and connect leads. When installing terminal lugs on transformer terminals, hold bottom nut with wrench while tightening outer nuts.

(4) Using screwdriver, secure junction box cover with ten screws and lock washers.

Follow-on procedure: Install junction box. (See para 4-44.)

4-51. CONTROL RELAY (K10)

Preliminary procedure: Remove lower front panel and junction box cover. (See para 4-45.)



TS4120-370-14/4-69

Figure 4-69. Control Relay (K10)

a. Removal

(1) Release relay hold down spring ends from relay.

(2) Pull control relay (K10) from socket.

b. Inspection (relay and socket)

(1) Check that relay and socket are not cracked or broken.

(2) Check that contacts are not corroded, loose, bent, or missing.

(3) Check that wire leads to socket are not damaged, loose, or missing and that they are properly connected. (See wiring diagram, fig. 4-20.)

c. Test

(1) Using a multimeter set on lowest OHMS scale, check continuity.

- Continuity should be indicated across the following contacts:

A to B

1 to 7

3 to 9

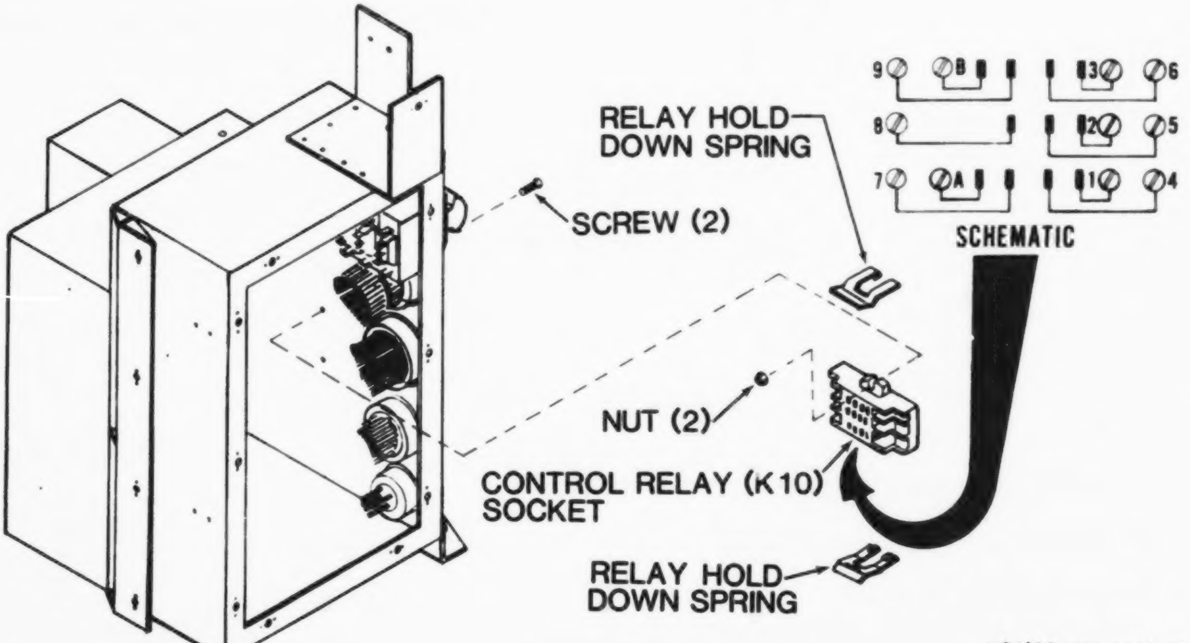
- Continuity should not be indicated across the following contacts:

1 to 4

3 to 6

(2) If relay fails above tests, replace relay.

(3) Using a multimeter and schematic shown on figure 4-70, check continuity between contacts and terminals of control relay socket.


9
B
3
6
8
2
5
7
A
1
4
SCHEMATIC
RELAY HOLD DOWN SPRING
SCREW (2)
NUT (2)
CONTROL RELAY (K10) SOCKET
RELAY HOLD DOWN SPRING

TS4120-370-14/4-70

Figure 4-70. Control Relay (K10) Socket

d. Relay socket removal

(1) Using screwdriver and wrench, remove two screws, relay hold down springs, and nuts from socket.

(2) Tag and remove leads.

(3) Remove socket.

e. Installation

NOTE

If relay socket was not removed, skip steps (1), (2), and (3).

(1) See tags and wiring diagram (fig. 4-20) and connect leads to relay socket.

(2) Clip relay hold down springs onto relay socket.

(3) Using screwdriver and wrench, secure relay socket and hold down springs with two screws and nuts.

(4) Aline relay and socket contacts and push relay firmly into socket and hold down springs.

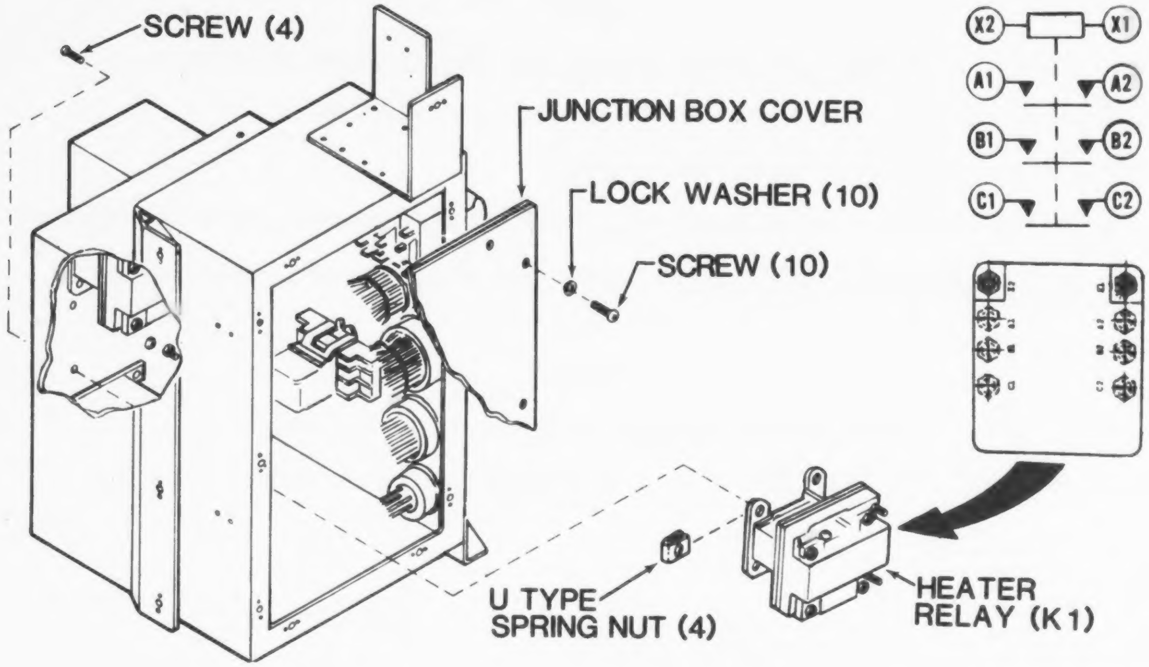
NOTE

Check that relay hold down springs clip into slots on relay.

Follow-on procedure: Install junction box cover and lower front panel. (See para 4-45.)

4-52. HEATER RELAY (K1)

Preliminary procedure: Remove junction box. (See para 4-44.)


SCREW (4)
JUNCTION BOX COVER
LOCK WASHER (10)
SCREW (10)
U TYPE SPRING NUT (4)
HEATER RELAY (K1)
X2
X1
A1
A2
B1
B2
C1
C2

TS4120-370-14/4-71

Figure 4-71. Heater Relay (K1)

a. Removal

(1) Using a screwdriver, remove ten screws and lock washers from junction box cover.

(2) Remove cover.

(3) Tag and disconnect wire leads.

(4) Using screwdriver, remove four screws from relay.

(5) Remove U type spring nuts from relay.

(6) Remove relay.

b. Inspection

(1) Check for loose, corroded, missing, or broken terminal connections.

(2) Check relay for cracks, evidence of overheating, and other visible damage. Replace if damaged.

c. Test

(1) Use a continuity tester or a multimeter set on the lowest OHMS scale to check continuity between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be open. If there is continuity, replace the relay.

(2) Check continuity between coil terminals X1 and X2. If there is no continuity, the coil is open, replace the relay.

(3) Apply 24 volts dc across terminals X1 and X2 and repeat continuity checks between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be closed. If there is no continuity, replace the relay.

(4) Remove the 24 volts dc from the coil terminals X1 and X2.

d. Installation

(1) Place U type spring nuts on four mounting holes.

(2) Using screwdriver, secure relay with four screws.

(3) See tags and wiring diagram (fig. 4-20) and connect wire leads.

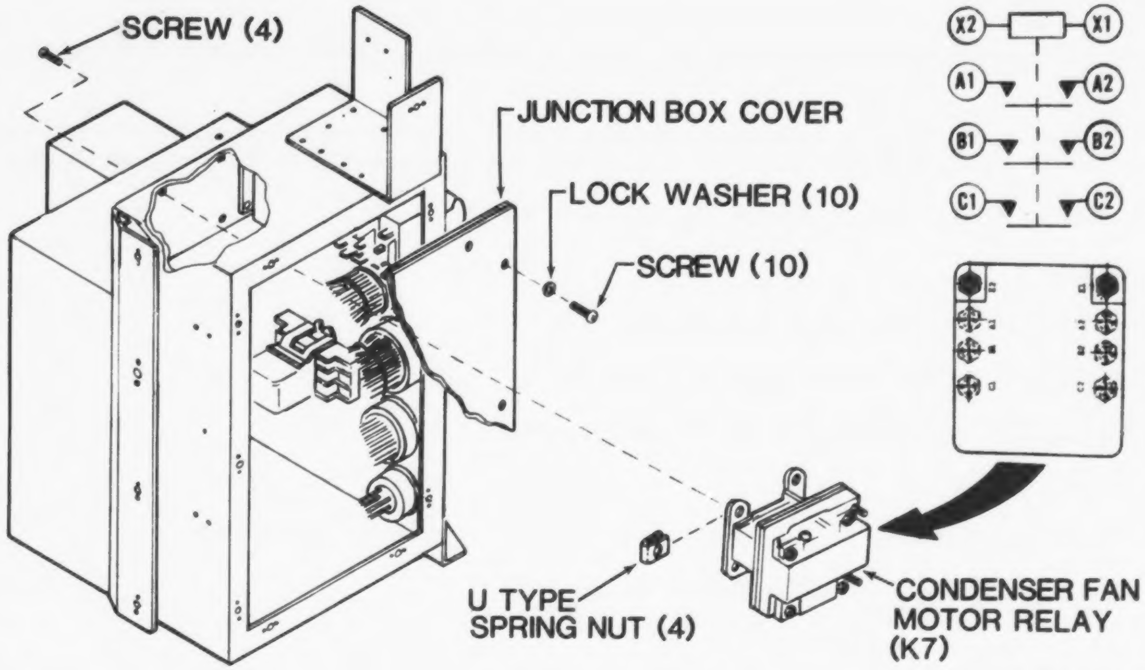
(4) Remove tags.

(5) Using a screwdriver, secure junction box cover with ten screws and lock washers.

Follow-on procedure: Install junction box. (See para 4-44.)

4-53. CONDENSER FAN MOTOR RELAY (K7)

Preliminary procedure: Remove junction box. (See para 4-44.)


SCREW (4)
JUNCTION BOX COVER
LOCK WASHER (10)
SCREW (10)
U TYPE SPRING NUT (4)
CONDENSER FAN MOTOR RELAY (K7)
X2
X1
A1
A2
B1
B2
C1
C2

TS4120-370-14/4-72

Figure 4-72. Condenser Fan Motor Relay (K7)

a. Removal

(1) Using a screwdriver, remove ten screws and lock washers from junction box cover.

(2) Remove cover.

(3) Tag and disconnect wire leads.

(4) Using screwdriver, remove four screws from relay.

(5) Remove U type spring nuts from relay.

(6) Remove relay.

b. Inspection

(1) Check for loose, corroded, missing, or broken terminal connections.

(2) Check relay for cracks, evidence of overheating, and other visible damage. Replace if damaged.

c. Test

(1) Use a continuity tester or a multimeter set on the lowest OHMS scale to check continuity between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be open. If there is continuity, replace the relay.

(2) Check continuity between coil terminals X1 and X2. If there is no continuity, the coil is open. Replace the relay.

(3) Apply external 24 volts dc power source across terminals X1 and X2 and repeat continuity checks between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be closed. If there is no continuity, replace the relay.

(4) Remove the external 24 volts dc power source from coil terminals X1 and X2.

d. Installation

(1) Place U type spring nuts on four mounting holes.

(2) Using screwdriver, secure relay with four screws.

(3) See tags and wiring diagram (fig. 4-20) and connect wire leads.

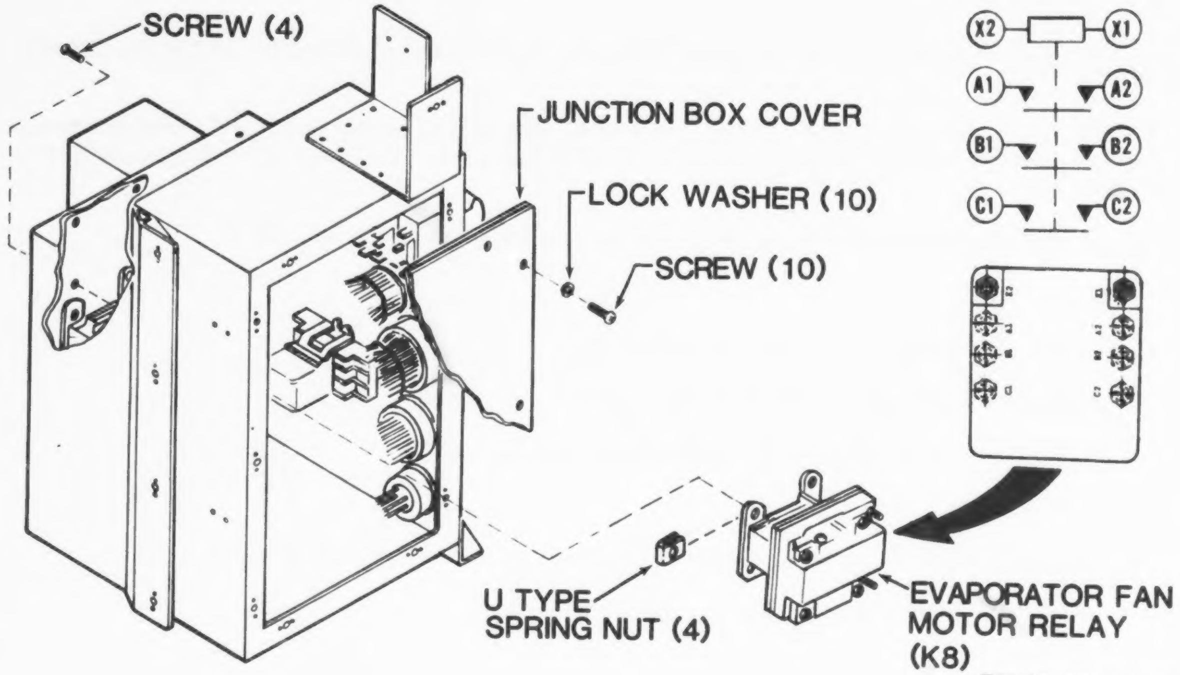
(4) Remove tags.

(5) Using a screwdriver, secure junction box cover with ten screws and lock washers.

Follow-on procedure: Install junction box. (See para 4-44.)

4-54. EVAPORATOR FAN MOTOR RELAY (K8)

Preliminary procedure: Remove junction box. (See para 4-44.)


SCREW (4)
JUNCTION BOX COVER
LOCK WASHER (10)
SCREW (10)
U TYPE SPRING NUT (4)
EVAPORATOR FAN MOTOR RELAY (K8)
X2
X1
A1
A2
B1
B2
C1
C2

TS4120-370-14/4-73

Figure 4-73. Evaporator Fan Motor Relay (K8)

a. Removal

(1) Using a screwdriver, remove ten screws and lock washers from junction box cover.

(2) Remove cover.

(3) Tag and disconnect wire leads.

(4) Using screwdriver, remove four screws from relay.

(5) Remove U type spring nuts from relay.

(6) Remove relay.

b. Inspection

(1) Check for loose, corroded, missing, or broken terminal connections.

(2) Check relay for cracks, evidence of overheating, and other visible damage. Replace if damaged.

c. Test

(1) Use a continuity tester or a multimeter set on the lowest OHMS scale to check continuity between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be open. If there is continuity, replace the relay.

(2) Check continuity between coil terminals X1 and X2. If there is no continuity, the coil is open. Replace the relay.

(3) Apply external 24 volts dc power source across terminals X1 and X2 and repeat continuity checks between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be closed. If there is no continuity, replace the relay.

(4) Remove the external 24 volts dc power source from coil terminals X1 and X2.

d. Installation

(1) Place U type spring nuts on four mounting holes.

(2) Using screwdriver, secure relay with four screws.

(3) See tags and wiring diagram (fig. 4-20) and connect wire leads.

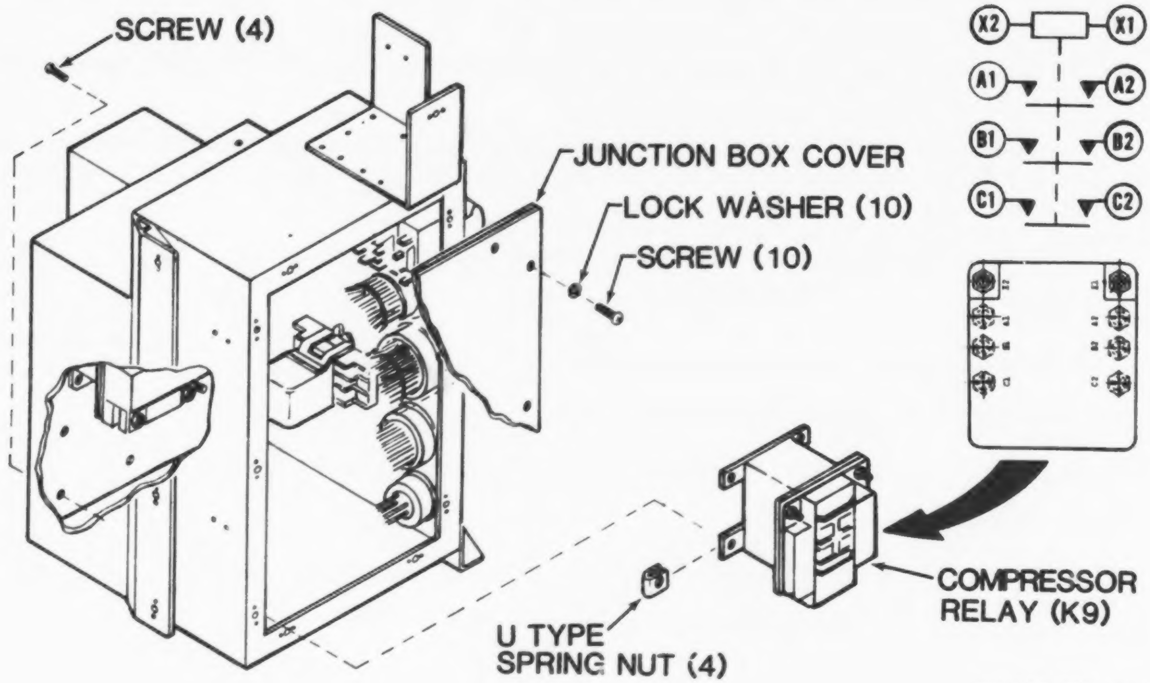
(4) Remove tags.

(5) Using a screwdriver, secure junction box cover with ten screws and lock washers.

Follow-on procedure: Install junction box. (See para 4-44.)

4-55. COMPRESSOR RELAY (K9)

Preliminary procedure: Remove junction box. (See para 4-44.)


SCREW (4)
JUNCTION BOX COVER
LOCK WASHER (10)
SCREW (10)
X2
X1
A1
A2
B1
B2
C1
C2
COMPRESSOR RELAY (K9)
U TYPE SPRING NUT (4)

TS4120-370-14/4-74

Figure 4-74. Compressor Relay (K9)

a. Removal

(1) Using a screwdriver, remove ten screws and lock washers from junction box cover.

(2) Remove cover.

(3) Tag and disconnect wire leads.

(4) Using screwdriver, remove four screws from relay.

(5) Remove U type spring nuts from relay.

(6) Remove relay.

b. Inspection

(1) Check for loose, corroded, missing, or broken terminal connections.

(2) Check relay for cracks, evidence of overheating, and other visible damage. Replace if damaged.

c. Test

(1) Use continuity tester or a multimeter set on the lowest OHMS scale to check continuity between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be open. If there is continuity, replace the relay.

(2) Check continuity between coil terminals X1 and X2. If there is no continuity, the coil is open. Replace the relay.

(3) Apply external 24 volts dc power source across terminals X1 and X2 and repeat continuity checks between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be closed. If there is no continuity, replace the relay.

(4) Remove the external 24 volt dc power source from coil terminals X1 and X2.

d. Installation

(1) Place U type spring nuts on four mounting holes.

(2) Using screwdriver, secure relay with four screws.

(3) See tags and wiring diagram (fig. 4-20) and connect wire leads.

(4) Remove tags.

(5) Using a screwdriver, secure junction box cover with ten screws and lock washers.

Follow-on procedure: Install junction box. (See para 4-44.)

4-56. TERMINAL BOARDS (TB1 and TB2)

Preliminary procedure: Remove junction box. (See para 4-44.)

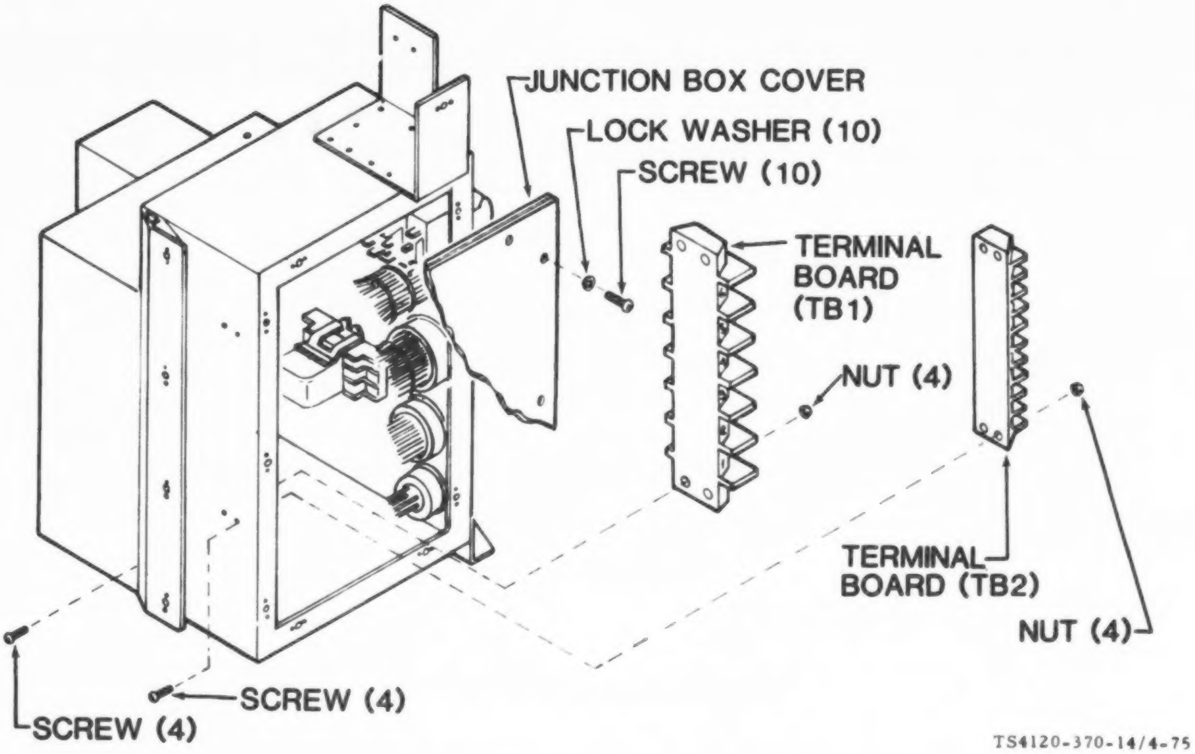

JUNCTION BOX COVER
LOCK WASHER (10)
SCREW (10)
TERMINAL BOARD (TB1)
NUT (4)
TERMINAL BOARD (TB2)
NUT (4)
SCREW (4)
SCREW (4)
TS4120-370-14/4-75

Figure 4-75. Terminal Boards (TB1 and TB2)

a. Access

(1) Using a screwdriver, remove ten screws and lock washers from junction box cover.

(2) Remove cover.

b. Inspection

(1) Check terminal boards for loose or corroded terminals, cracks, and obvious damage. Replace if cracked or broken .

(2) Check that wire leads are secure and properly located. (See fig. 4-20.)

c. Removal

(1) Tag and disconnect wire leads.

(2) Using screwdriver and wrench, remove four screws and nuts from each terminal board.

d. Installation

(1) Using screwdriver and wrench, secure terminal boards to junction box with four each screws and nuts.

(2) See tags and wiring diagram (fig. 4-20) and connect wire leads.

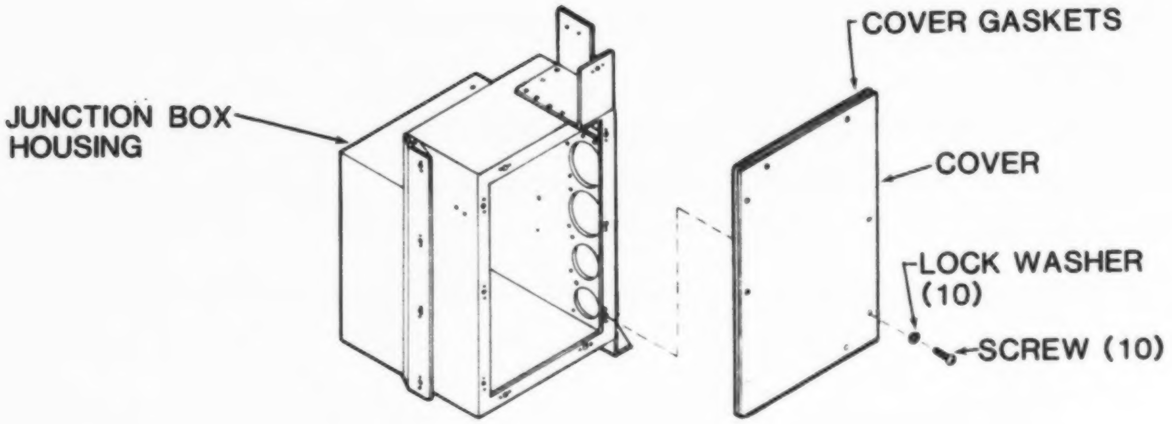
(3) Remove tags.

(4) Using a screwdriver, secure junction box cover with ten screws and lock washers.

Follow-on procedure: Install junction box. (See para 4-44.)

4-57. JUNCTION BOX HOUSING AND COVER

Preliminary procedure: Remove junction box. (See para 4-44.)



TS4120-370-14/4-76

Figure 4-76. Junction Box Housing and Cover

a. Access

(1) Using screwdriver, remove ten screws and lock washers from junction box cover.

(2) Remove cover.

b. Inspection

(1) Check that cover is not bent or punctured. Replace if damaged.

(2) Check that gaskets are not cracked, loose, or missing.

(3) Check junction box housing for cracked welds and loose or missing hardware. Replace or repair as required.

c. Disassembly/Reassembly. See paragraphs 4-46 through 4-56 for removal/installation of parts.

d. Installation. Using screwdriver, secure junction box cover with ten screws and lock washers.

Follow-on procedure: Install junction box. (See para 4-44.)

4-58. EVAPORATOR FANS

Preliminary procedures:
1. Remove top panel. (See para 4-24.)
2. Remove conditioned air filter. (See para 4-31.)

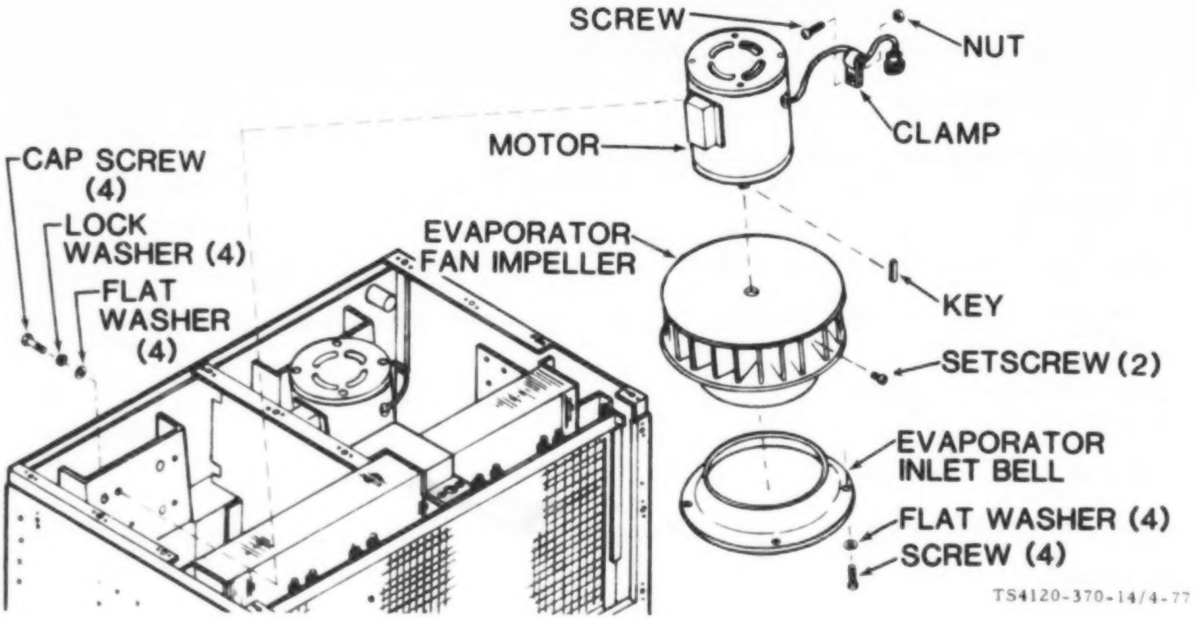

SCREW
NUT
CLAMP
MOTOR
CAP SCREW (4)
LOCK WASHER (4)
FLAT WASHER (4)
EVAPORATOR FAN IMPELLER
KEY
SETSCREW (2)
EVAPORATOR INLET BELL
FLAT WASHER (4)
SCREW (4)
TS4120-370-14/4-77

Figure 4-77. Evaporator Fans

a. Removal

(1) Check to see that power has been disconnected.

(2) Disconnect motor cable connector.

(3) Using screwdriver and wrench, remove clamp, screw, and nut from motor cable.

(4) Support or hold motor and fan assembly as hardware is removed.

(5) Using wrench, remove four cap screws, lock washers, and flat washers from motor.

(6) Carefully lift motor and fan assembly from unit.

(7) Using allen wrench, loosen two setscrews in fan hub.

(8) Remove fan from motor.

(9) Take care that motor shaft key is not lost.

NOTE

If inlet bell does not require removal, skip steps (10) and (11).

(10) Using screwdriver, remove four screws and flat washers from inlet bell.

(11) Remove inlet bell.

(12) Go back to step (1) and remove the other fan.

b. Inspection

(1) Check fans for dents, bent or loose fan blades, and that hub is securely attached. Replace if damaged.

(2) Check inlet bell for dents or any distortion that would cause interference with fans. Replace if damaged.

(3) If a motor problem is suspected, inspect or test motors in accordance with paragraph 4-59.

c. Clean

(1) Use a clean dry cloth and a soft brush to remove dirt from fans.

(2) If fans and inlet bells are excessively dirty, wash them with a mild detergent and water solution.

d. Installation

NOTE

If inlet bell was not removed, skip step (1).

(1) Using screwdriver, secure evaporator inlet bell with four screws and flat washers.

(2) Check to see that key is in place on motor shaft.

CAUTION

The fans are not identical parts. They rotate in opposite directions. Take care that correct fan is used. See figure 4-78 for rotation and check rotation arrow on fan.

(3) Slip fan all the way onto motor shaft and temporarily tighten two setscrews.

(4) Place motor and fan assembly into unit and aline mounting holes.

(5) Using wrench, secure motor and fan assembly with four cap screws, lock washers, and flat washers.

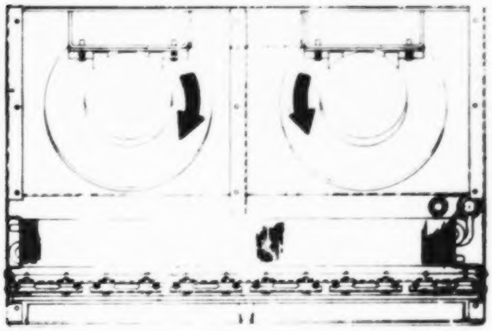

TS4120-370-14/4-78

Figure 4-78. Evaporator Fan Rotation

(6) Loosen setscrews and slip fan down so that there is 0.06 to 0.08 (0.15 to 0.20 cm) clearance between fan and inlet bell.

(7) Using allen wrench, tighten two setscrews.

(8) Check that fan is centered on inlet bell. If it is not, loosen mounting hardware and adjust as necessary. Retighten mounting hardware.

(9) Spin fan and check that there is no interference with inlet bell.

(10) Using screwdriver and wrench, secure motor cable with a clamp, screw, and nut.

(11) If the other fan was removed, go back to step (1) and install the other fan.

(12) Connect motor cable connectors.

WARNING

The following test must be connected with the power on. Exercise extreme caution.

(13) Connect power and turn mode selector switch on VENTILATE. Check that fans are rotating in proper direction. (See fig. 4-78.)

(14) Turn unit OFF.

Follow-on procedures:
1. Install conditioned air filter. (See para 4-31.)
2. Install top panel. (See para 4-24.)

4-59. EVAPORATOR FAN MOTORS (B3 AND B4)

Preliminary procedures:
1. Remove top panel. (See para 4-24.)
2. Remove conditioned air filter. (See para 4-31.)

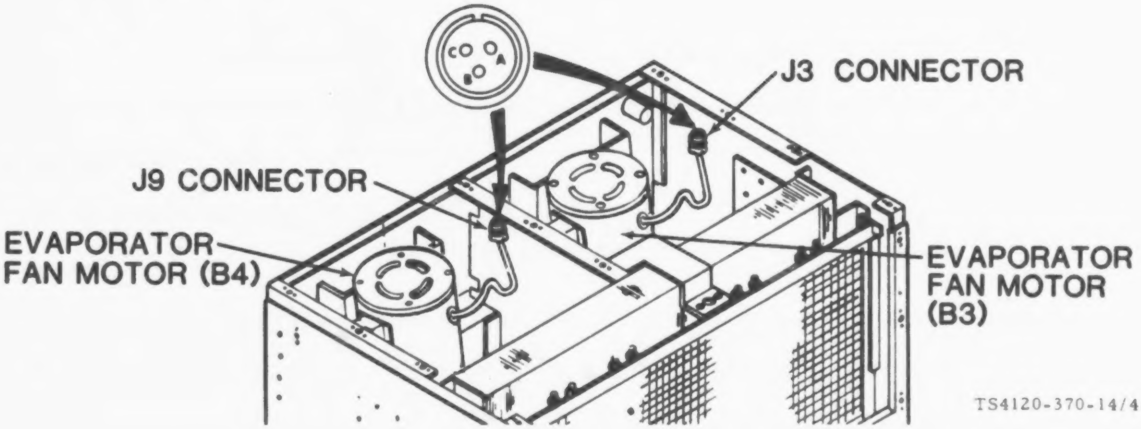

C
A
B
J3 CONNECTOR
J9 CONNECTOR
EVAPORATOR FAN MOTOR (B4)
EVAPORATOR FAN MOTOR (B3)
TS4120-370-14/4-79

Figure 4-79. Evaporator Fan Motor Electrical Test

a. Test (Installed)

(1) Check to see that power has been disconnected.

(2) Check motor for rotational freedom by spinning fan. If there is any stiffness or binding, contact direct support maintenance.

(3) Check motor bearings for lateral or end play. If there is excessive lateral or end play, contact direct support maintenance.

(4) Electrically test motor as follows:

- Disconnect motor cable connector.
- Use a multimeter set on lowest OHMS scale to check continuity between A and B, A and C, and B and C in connector. If there is no continuity between any pair of pins, the motor winding is open. Replace motor.

- Use a multimeter set on lowest OHMS scale to check for continuity between each pin in connector (A, B, and C) and the motor housing. If there is continuity between any pin and motor housing, the motor winding is shorted. Replace motor.
- Use a multimeter set on high OHMS scale to test stator insulation by checking between each pin in connector (A, B, and C) and motor housing. A reading of less than 500,000 ohms indicates insulation failure. Replace motor.

NOTE

If all the above inspections and tests are satisfactory, but the motor will still not operate properly, notify direct support maintenance, who may desire to make further tests before it is removed.

b. Removal

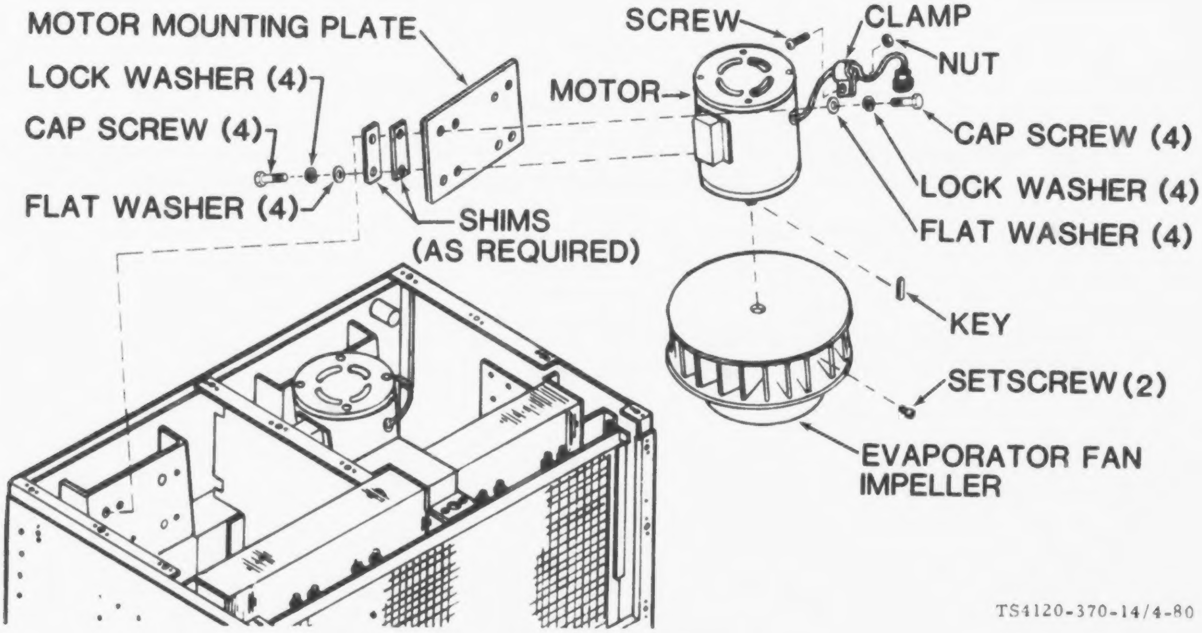

MOTOR MOUNTING PLATE
LOCK WASHER (4)
CAP SCREW (4)
FLAT WASHER (4)
SHIMS (AS REQUIRED)
SCREW
CLAMP
NUT
MOTOR
CAP SCREW (4)
LOCK WASHER (4)
FLAT WASHER (4)
KEY
SETSCREW(2)
EVAPORATOR FAN IMPELLER
TS4120-370-14/4-80

Figure 4-80. Evaporator Fan Motors

(1) Check to see that power has been disconnected.

(2) Disconnect motor cable connector.

(3) Using screwdriver and wrench, remove clamp, screw, and nut from motor cable.

(4) Support or hold motor and fan assembly as hardware is removed.

(5) Using wrench, remove four cap screws, lock washers, and flat washers from motor.

(6) Carefully lift motor and fan assembly from unit.

(7) Using allen wrench, loosen two setscrews in fan hub.

(8) Remove fan from motor.

(9) Take care that motor shaft key is not lost.

NOTE

If motor base plate does not require removal, skip steps (10) and (11).

(10) Using wrench, remove four cap screws, lock washers, and flat washers from casing and base plate. Note number and position of shims.

(11) Remove base plate and shims.

c. Installation

NOTE

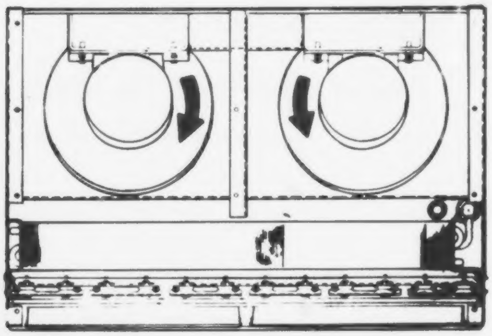
If motor base plate was not removed, skip step (1).

(1) Using wrench, secure base plate and shims to motor with four cap screws and lock washers and flat washers. Shims should be installed in their original position unless motor alinement changes are required.

(2) Check to see that key is in place on motor shaft.

CAUTION

The fans are not identical parts. They rotate in opposite directions. Take care that correct fan is used. See figure 4-81 for rotation and check rotation arrow on fan.



TS4120-370-14/4-81

Figure 4-81. Evaporator Fan Rotation

(3) Slip fan all the way onto motor shaft and temporarily tighten two setscrews.

(4) Place motor and fan assembly into unit and aline mounting holes.

(5) Using wrench, secure motor and fan assembly with four cap screws, lock washers, and flat washers.

(6) Loosen setscrews and slip fan down so that there is 0.06 to 0.08 (0.15 to 0.20 cm) clearance between fan and inlet bell.

(7) Using allen wrench, tighten two setscrews.

(8) Check that fan is centered on inlet bell. If it is not, loosen mounting hardware and adjust as necessary. Retighten mounting hardware. If front to rear adjustment is required, remove motor from motor base plate and add or remove shims as necessary.

(9) Spin fan and check that there is no interference with inlet bell.

(10) Using screwdriver and wrench, secure motor cable with a clamp, screw, and nut.

(11) If the other fan and motor was removed, go back to step (1) and install the other fan and motor.

(12) Connect motor cable connectors.

WARNING

The following test must be conducted with the power on. Exercise extreme caution.

(13) Connect power and turn mode selector switch to VENTILATE. Check that fans are rotating in proper direction. (See fig. 4-81.)

(14) Turn unit OFF.

Follow-on procedures:

1. Install conditioned air filter. (See para 4-31.)
2. Install top panel. (See para 4-24.)

4-60. HEATER THERMOSTAT(S3)

Preliminary procedure: Remove mist eliminator. (See para 4-32.)

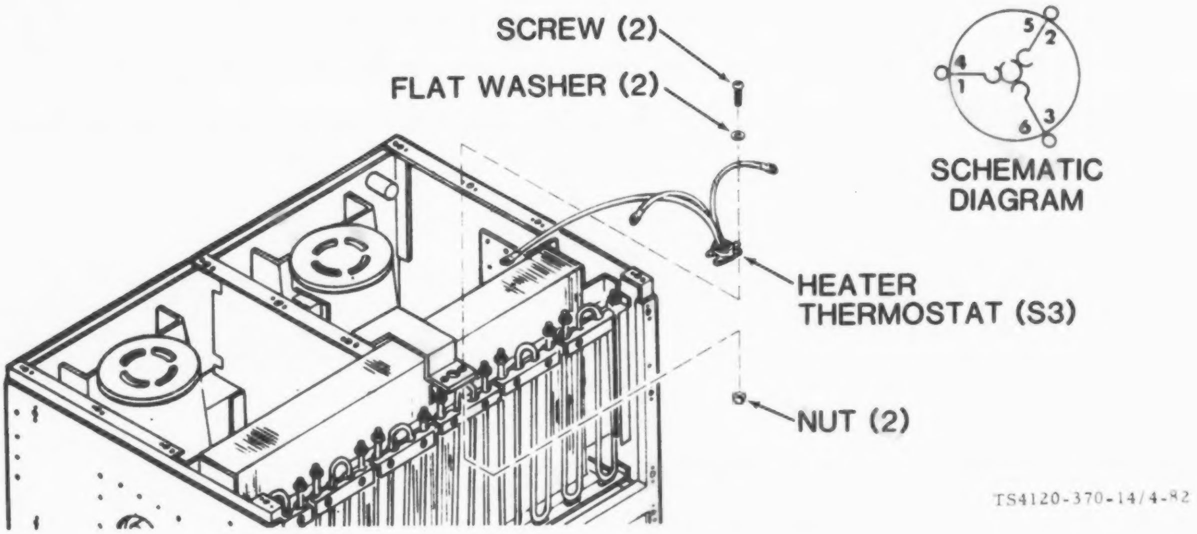

SCREW (2)
FLAT WASHER (2)
HEATER THERMOSTAT (S3)
NUT (2)
5
2
4
1
6
3
SCHEMATIC DIAGRAM
TS4120-370-14/4-82

Figure 4-82. Heater Thermostat (S3)

a. Removal

(1) Check to see that power has been disconnected.

(2) Tag and disconnect leads.

(3) Using screwdriver and wrench, remove two screws, flat washers, and nuts.

(4) Remove thermostat.

b. Test. With thermostat at room temperature, use a multimeter set on the lowest OHMS scale to check for continuity between each pair of contacts (4 and 6, 4 and 5, and 5 and 6). If continuity is not indicated between all contacts, replace the thermostat.

NOTE

For full operational test of thermostat use an external heat source. Thermostat should open (no continuity across contacts) at temperature increase of 194°F ± 9° (90°C ±5°) and close at temperature decrease at 142°F ± 16° (61°C ± 9°).

c. Installation

(1) Using screwdriver and wrench, secure thermostat to bracket with two screws, flat washers, and nuts.

(2) See tags and wiring diagram (fig. 4-20) and connect wire leads.

(3) Remove tags.

(4) Carefully tie wires so that they cannot contact heaters.

Follow-on procedure: Install mist eliminator. (See para 4-32.)

4-61. HEATER ELEMENTS (HR1 THROUGH HR6)

Preliminary procedure: Remove mist eliminator. (See para 4-32.)

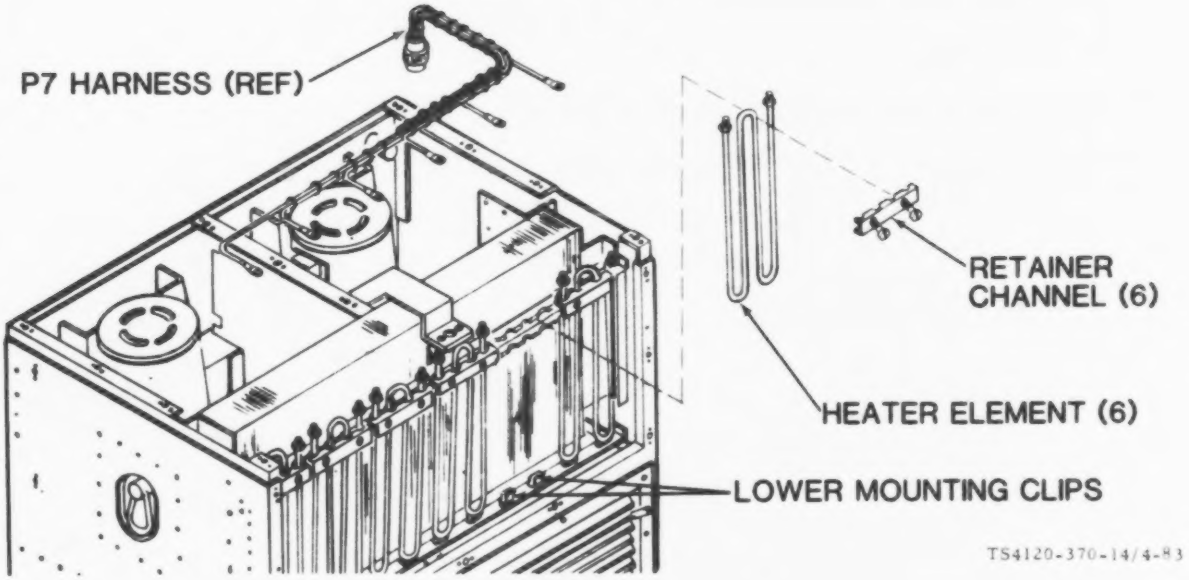

P7 HARNESS (REF)
RETAINER CHANNEL (6)
HEATER ELEMENT (6)
LOWER MOUNTING CLIPS
TS4120-370-14/4-83

Figure 4-83. Heating Elements (HR1 Through HR6)

a. Removal

(1) Check to see that power has been disconnected.

(2) Tag and disconnect the wire leads from the heater that is being removed.

(3) Using a screwdriver, loosen the two captive panel fasteners in the retainer channel.

(4) Pull heater element free of lower mounting clip and remove heater.

b. Inspection/Testing

(1) Check heater elements for damaged terminal threads and cracked or deformed outside covering. Replace if damaged.

(2) Using a multimeter set on lowest OHMS scale, check for continuity between the two terminal studs. Replace heater if no continuity is indicated.

c. Installation

(1) Insert heater element into lower mounting clip.

(2) Using screwdriver, secure top of heater with retainer channel by tightening the two captive panel fasteners.

(3) See tag and wiring diagram (fig. 4-20) and connect wire leads.

(4) Remove tags.

(5) Carefully tie wires so that they cannot contact heaters.

Follow-on procedure: Install mist eliminator. (See para 4-32.)

4-62. CONDENSER FANS

Preliminary procedures:

1. Remove lower front panel. (See para 4-25.)
2. Remove condenser fan covers. (See para 4-22.)

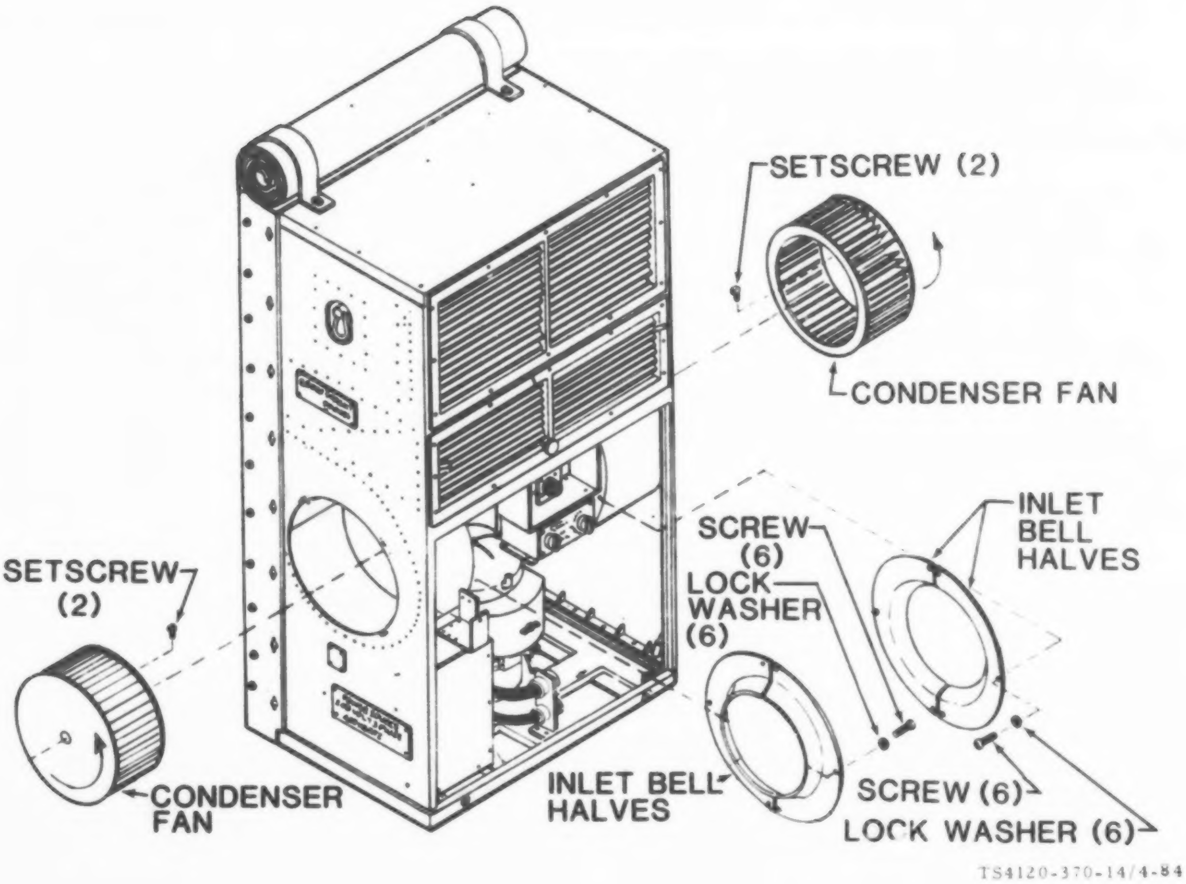

SETSCREW (2)
CONDENSER FAN
INLET BELL HALVES
SCREW (6)
LOCK WASHER (6)
SETSCREW (2)
CONDENSER FAN
INLET BELL HALVES
SCREW (6)
LOCK WASHER (6)
TS4120-370-14/4-84

Figure 4-84. Condenser Fans

a. Removal

(1) Check to see that power has been disconnected.

(2) Using allen wrench, loosen two setscrews in each fan.

(3) Remove fans.

(4) Using screwdriver, remove six screws and lock washers from each set of inlet bells.

NOTE

The actuating cylinder control capilliary line clamp is attached by above hardware. Note location for reassembly.

(5) Remove inlet bell halves.

b. Inspection

(1) Check fans for dents, bent or loose blades, and that hub is securely attached. Replace if damaged.

(2) Check inlet bells for dents or any distortion that would cause interference with fans. Replace if damaged.

(3) If a motor problem is suspected, inspect or test motors in accordance with paragraph 4-63.

c. Clean

(1) Use a clean dry cloth and a soft brush to remove dirt from fans.

(2) If fans and inlet bells are excessively dirty, wash them with a mild detergent and water solution.

d. Installation

NOTE

The fans are not identical parts. Take care that fans are installed on correct side. See figure 4-84 for rotation and placement information. See rotation arrow on fan

(1) Aline setscrews with flats on motor shaft and slip fans onto motor shaft.

(2) Center fans in fan housings.

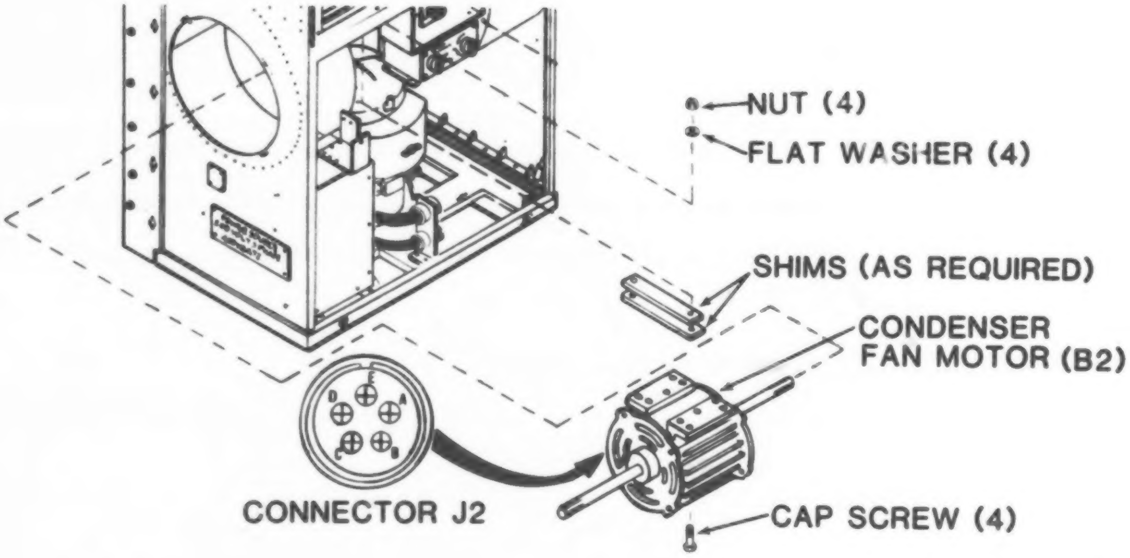
(3) Using allen wrench, tighten two setscrews in each fan hub.

(4) Using screwdriver, secure inlet bell halves with six screws and lock washers each set. Take care that actuator cylinder capillary clamp is reinstalled in original position.

Follow-on procedures:
1. Install condenser fan covers. (See para 4-22.)
2. Install lower front panel. (See para 4-25.)

4-63. CONDENSER FAN MOTOR (B2)

Preliminary procedure: Remove condenser fans. (See para 4-62.)


NUT (4)
FLAT WASHER (4)
SHIMS (AS REQUIRED)
CONDENSER FAN MOTOR (B2)
CONNECTOR J2
CAP SCREW (4)
E
D
A
C
B

TS4120-370-14/4-85

Figure 4-85. Condenser Fan Motor (B2)

a. Test (Installed)

(1) Check to see that power has been disconnected.

(2) Check motor for rotational freedom by spinning fans. If there is any stiffness or binding, contact direct support.

(3) Check motor bearings for lateral or end play. If there is excessive lateral or end play, contact direct support.

(4) Electrically test motor at J2 connector as follows:

- Disconnect motor cable connector P2.
- Use a multimeter set on lowest OHMS scale to check continuity between pins A and B, A and C, and B and C in connector. If there is no continuity between any pair of pins, the motor winding is open. Replace motor.
- Use a multimeter set on lowest OHMS scale to check for continuity between each pin in connector (A, B, and C) and the motor housing. If there is continuity between any pin and motor housing, the motor winding is shorted. Replace the motor.
- Use a multimeter set on high OHMS scale to test stator insulation by checking between each pin in connector (A, B, and C) and motor housing. A reading of less than 500,000 ohms indicates insulation failure. Replace motor.
- Check continuity between pins D and E. If there is no continuity, this indicates an open thermostat. Contact direct support maintenance.

NOTE

If all of the above inspections and tests are satisfactory, but the motor will still not operate properly, notify direct support maintenance, who may desire to make further tests before motor is removed.

b. Removal (Requires two people)

(1) Check to see that power has been disconnected.

(2) Disconnect motor cable connector.

CAUTION

Take care that capillary tubing wires and cables are not damaged.

(3) Support or hold motor in place and note number and location of shims as mounting hardware is removed.

(4) Using two wrenches, remove four cap screws, flat washers, and nuts from motor mount.

(5) Lift motor and shims from unit.

c. Installation (Requires two people.)

CAUTION

Take care that capillary tubing wires and cables are not damaged.

(1) Lift motor into position, insert shims in same location as on motor that was removed. (See b.(3) above.)

(2) Using two wrenches, secure motor to mount with four screws, flat washers, and nuts.

(3) See paragraph 4-62 and install fans. Do not install lower front panel or condenser fan covers.

(4) Spin fans and check for interference. Adjust fans in or out on shaft. Adjust motor front to rear by loosening mounting screws, or up and down by adding or removing shims as needed.

(5) Connect P2 harness connector to motor.

Follow-on procedures:

1. Install condenser fan covers. (See para 4-22.)
2. Install lower front panel. (See para 4-25.)

4-64. SAFETY CONTROL BOX ASSEMBLY

Preliminary procedure: Remove lower front panel. (See para 4-25.)

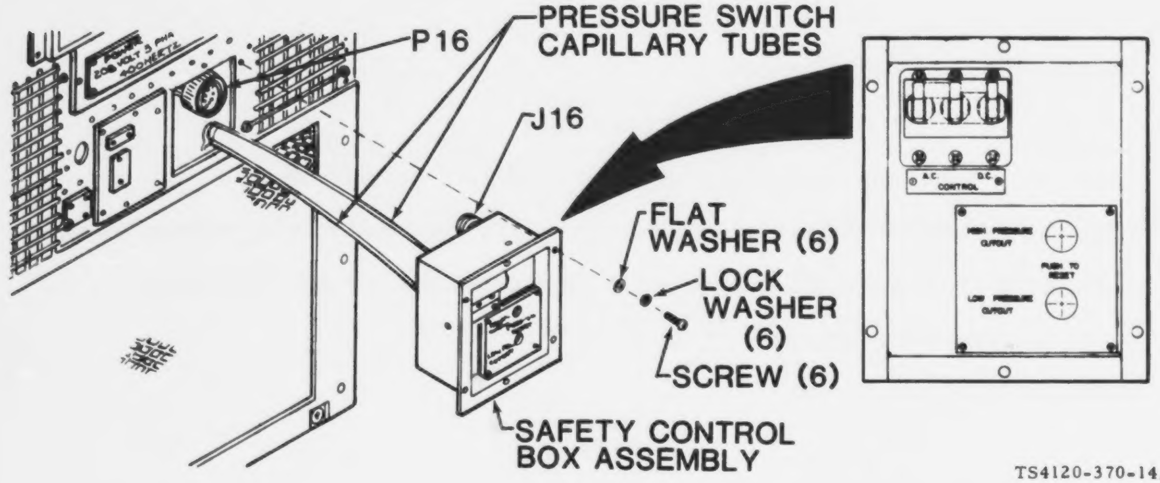
CAUTION

Disconnect input power to the air conditioner before performing any internal maintenance. Voltages used can KILL. Shutting the unit off at the control panel does not disconnect unit power.

a. Access

(1) Turn power off at power source.

(2) Disconnect power cable at air conditioner.


P16
PRESSURE SWITCH CAPILLARY TUBES
J16
FLAT WASHER (6)
LOCK WASHER (6)
SCREW (6)
SAFETY CONTROL BOX ASSEMBLY
A.C.
D.C.
CONTROL

TS4120-370-14/4-86

Figure 4-86. Safety Control Box Assembly

(3) Using screwdriver, remove six screws, lock washers, and flat washers from safety control box mounting flange.

(4) Disconnect P16 connector and harness from back side of box.

CAUTION

Take care that pressure switch capillary tubes are not damaged.

(5) Carefully slip safety control box out of unit far enough to gain access to safety control panel mounting screws.

(6) Support safety control box so that pressure switch capillary tubes will not be damaged.

(7) If safety control box is to be totally removed, contact direct support maintenance for pressure switch disconnection.

b. For inspection, test, and removal of internal parts see:

- Safety control box wiring harness (para 4-65)
- Control circuit breakers (CB2 and CB3) (para 4-66)
- For the HIGH and LOW PRESSURE CUT OUT switches contact direct support maintenance.

c. Installation

(1) Connect P16 connector and harness to J16 connector on back side of box.

CAUTION

Take care that pressure switch capillary tubes are not damaged.

(2) Carefully slip safety control box back into unit and aline mounting holes.

(3) Using screwdriver, secure safety control box to unit with six screws, lock washers, and flat washers.

(4) Install lower front panel. (See para 4-25.)

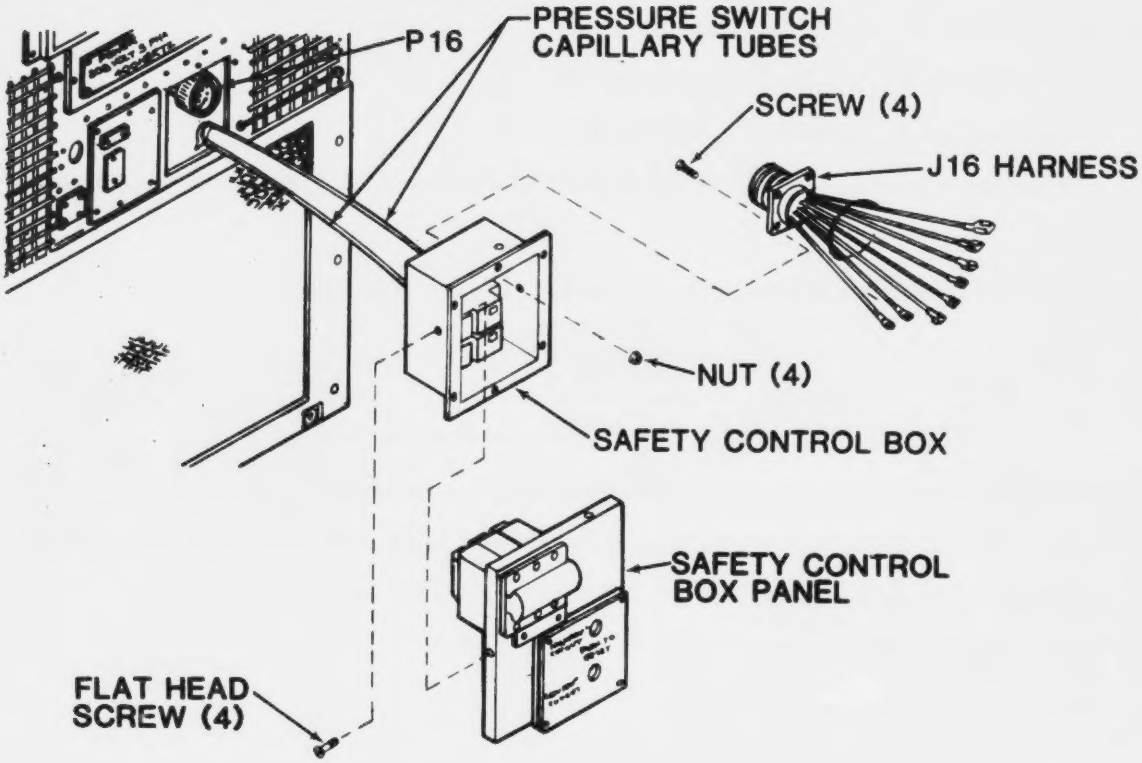
(5) Connect power cable to unit.

(6) Turn power on at power source.

best copy available

4-65. SAFETY CONTROL BOX WIRING HARNESS

Preliminary procedure: Pull safety control box out far enough to gain access to panel mounting screws. (See para 4-64.)


P16
PRESSURE SWITCH CAPILLARY TUBES
SCREW (4)
J16 HARNESS
NUT (4)
SAFETY CONTROL BOX
SAFETY CONTROL BOX PANEL
FLAT HEAD SCREW (4)

TS4120-370-14/4-87

Figure 4-87. Safety Control Box Wiring Harness

a. Inspection/Test

(1) Check to see that power has been disconnected.

(2) Using screwdriver, remove four flat head screws from safety control box panel.

(3) Carefully pull panel from safety control box far enough to gain access to internal wire leads.

(4) Check connectors P16 and J16 for general condition and loose, broken, or missing contacts. Replace damaged connectors.

(5) Check individual wires for loose solder connections, loose terminal lug connections, cut or frayed insulation, and cut or broken wires.

(6) See wiring diagram (fig. 4-20) and continuity test individual wires. Repair or replace wires with no continuity.

b. Repair

(1) See paragraph 4-35 for general wire repair instructions.

(2) See table 4-3 (Wire List) for wire lengths and terminal or connector information.

c. Removal

(1) Tag and disconnect wire leads.

(2) Using screwdriver and ratchet wrench with extension, remove four screws and nuts from J16 connector.

(3) Remove J16 harness.

d. Installation

(1) Using screwdriver and ratchet wrench with extension, secure J16 connector and harness with four screws and nuts.

(2) See tags and wiring diagram (fig. 4-20) and connect wire leads.

(3) Remove tags.

(4) Slip panel back into safety control box and aline holes.

(5) Using screwdriver, secure panel to safety control box with four flat head screws.

Follow-on procedure: Install safety control box. (See para 4-64.)

4-66. CONTROL CIRCUIT BREAKERS (CB2 AND CB3)

Preliminary procedure: Pull safety control box out far enough to gain access to panel mounting screws. (See para 4-64.)

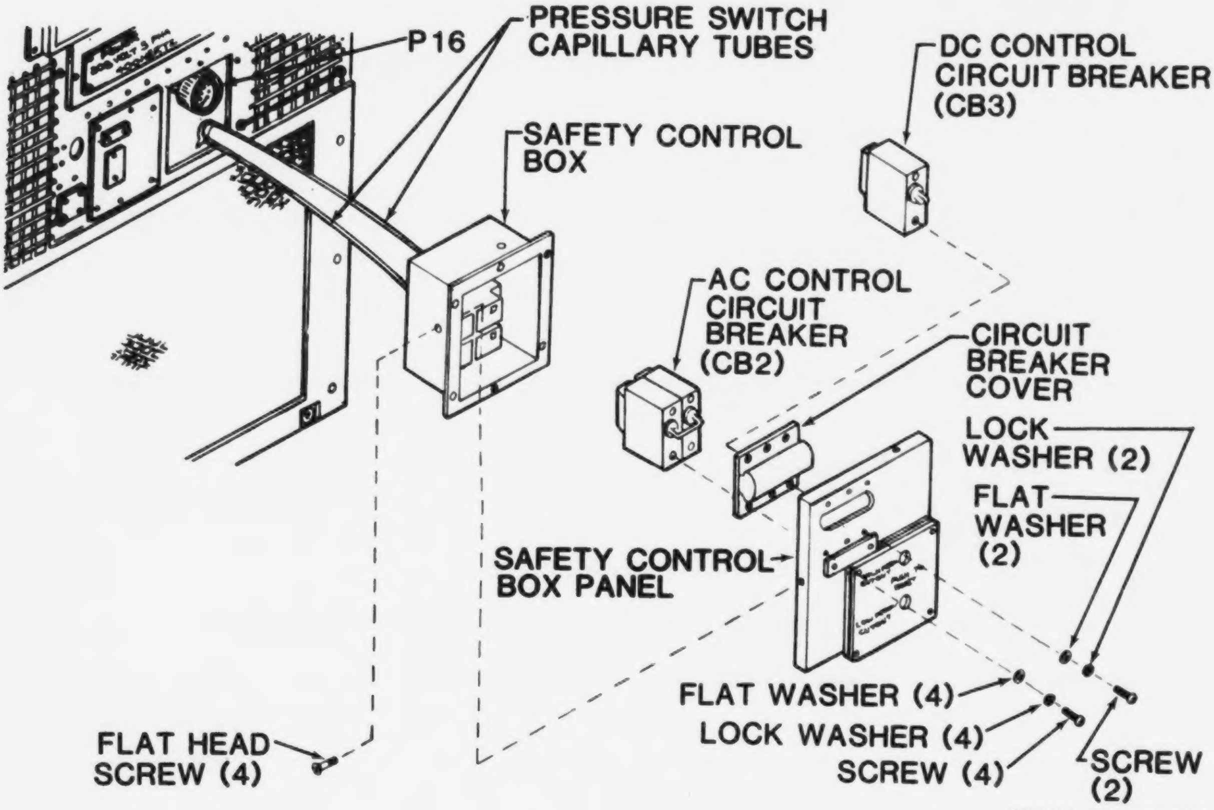

P16
PRESSURE SWITCH CAPILLARY TUBES
DC CONTROL CIRCUIT BREAKER (CB3)
SAFETY CONTROL BOX
AC CONTROL CIRCUIT BREAKER (CB2)
CIRCUIT BREAKER COVER
LOCK WASHER (2)
FLAT WASHER (2)
SAFETY CONTROL BOX PANEL
FLAT WASHER (4)
LOCK WASHER (4)
SCREW (4)
SCREW (2)
FLAT HEAD SCREW (4)
TS4120-370-14/4-88

Figure 4-88. Circuit Breakers (CB2 and CB3)

a. Inspection/Test

(1) Check to see that power has been disconnected.

(2) Using screwdriver, remove four flat head screws from safety control box panel.

(3) Carefully pull panel from safety control box far enough to gain access to circuit breaker terminal connections.

(4) Check that wire leads are properly connected. (See wiring diagram fig. 4-20.)

(5) Check circuit breakers for signs of overheating or other visible damage.

(6) Set circuit breaker reset bars in OFF position.

(7) Use multimeter set on lowest OHMS scale to check continuity between terminals A1 and A2 on circuit breaker CB3 and terminals A1 and A2 and B1 and B2 on circuit breaker CB2. All contacts should be open. If there is continuity on any check, replace circuit breaker(s).

(8) Press reset bars toward the OFF stop, then place them in the ON position.

(9) Use a multimeter set on the lowest OHMS scale and repeat continuity checks between terminals A1 and A2 on circuit breaker CB3 and terminals A1 and A2 and B1 and B2 on circuit breaker CB2. All contacts should be closed. If there is no continuity on any check, replace circuit breaker(s).

b. Removal

(1) Tag and disconnect wire leads.

(2) Using screwdriver remove six screws, lock washers, and flat washers.

(3) Remove circuit breaker(s) and circuit breaker cover.

c. Installation

(1) Using screwdriver, secure circuit breakers (CB2 and CB3) and circuit breaker cover to panel with six screws, lock washers, and flat washers.

(2) See tags and wiring diagram (fig. 4-20) and connect wire leads.

(3) Remove tags.

(4) Slip panel back into safety control box and aline holes.

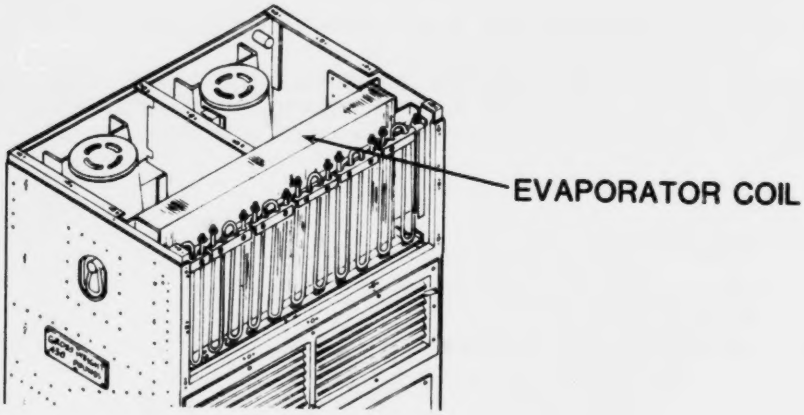
(5) Using screwdriver, secure panel to safety control box with four flat head screws.

Follow-on procedures:

1. Install safety control box. (See para 4-64.)
2. Check that circuit breakers are reset to the ON position.

4-67. EVAPORATOR COIL CLEANING

Preliminary procedure: Remove mist eliminator. (See para 4-32.)



TS4120-370-14/4-89

Figure 4-89. Evaporator Coil

a. Inspection of installed coil

(1) Check to be sure that power is disconnected.

(2) Check for accumulated dirt. Clean if an accumulation of dirt is evident.

(3) Check fins for dents, bent edges, or any condition that would block or distort air flow. Straighten all damaged fins with a plastic fin comb.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm^2). Do not direct compressed air against the skin. Use goggles or full face shield.

CAUTION

Do not use steam to clean coil.

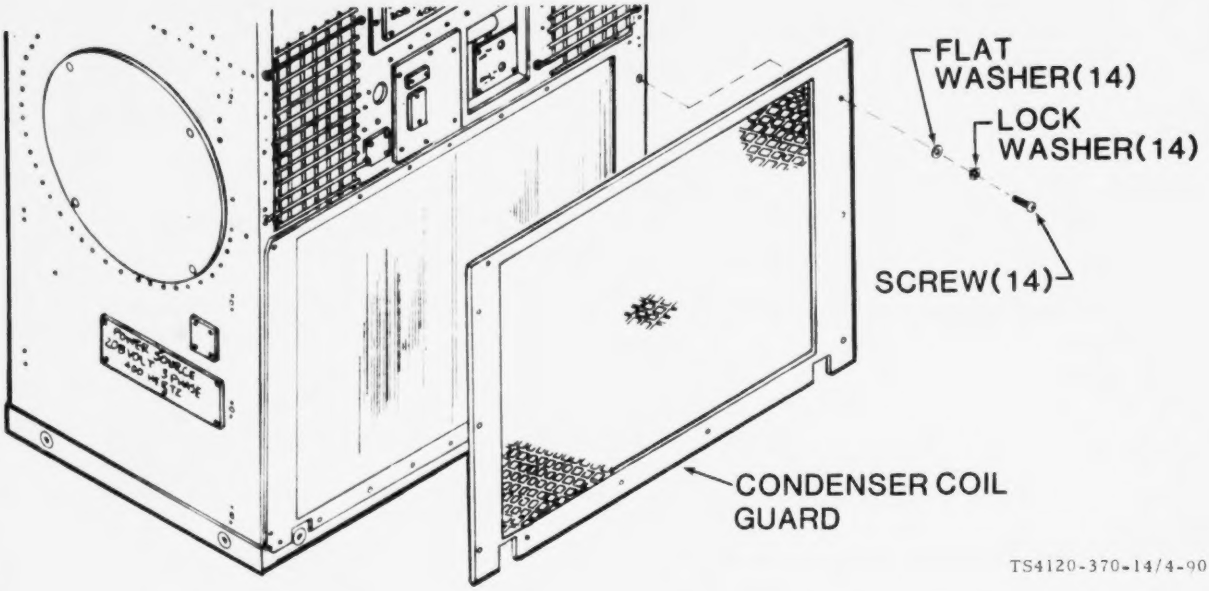
b. Cleaning. Clean coil with a soft bristle brush, vacuum cleaner and brush attachment, or use compressed air at 30 psi or less from the inside of the unit to blow the dirt out. Take care to avoid fin damage. When using compressed air, wear safety glasses or goggles. Dirt can be blown into your eyes.

c. Repair/Replacement. Should a leak or major damage be evident, refer to direct support maintenance.

Follow-on procedure. Install mist eliminator. (See para 4-32.)

4-68. CONDENSER COIL CLEANING

Preliminary procedures:
1. Remove lower front panel. (See para 4-25.)
2. Remove condenser coil guard. (See para 4-27.)



TS4120-370-14/4-90

Figure 4-90. Condenser Coil

a. Inspection of installed coil

(1) Check to be sure that power is disconnected.

(2) Check for accumulated dirt. Clean if an accumulation of dirt is evident.

(3) Check fins for dents, bent edges, or any condition that would block or distort air flow. Straighten all damaged fins with a plastic fin comb.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm^2). Do not direct compressed air against the skin. Use goggles or full face shield.

CAUTION

Do not use steam to clean coil.

b. Cleaning. Clean coil with a soft bristle brush, vacuum cleaner and brush attachment, or use compressed air at 30 psi or less from the inside of the unit to blow the dirt out. Take care to avoid fin damage. When using compressed air, wear safety glasses or goggles. Dirt can be blown into your eyes.

c. Repair/Replacement. Should a leak or major damage be evident, refer to direct support maintenance.

Follow-on procedures:
1. Install condenser coil guard. (See para 4-27.)
2. Install lower front panel. (See para 4-25.)

4-69. SOUND ATTENUATOR

This part is supplied only when specified on air conditioner ordering information.

NOTE

This paragraph is applicable only on units that have been specially equipped with a sound attenuator. When sound attenuator is installed, conditioned air intake and outlet grilles must be removed.

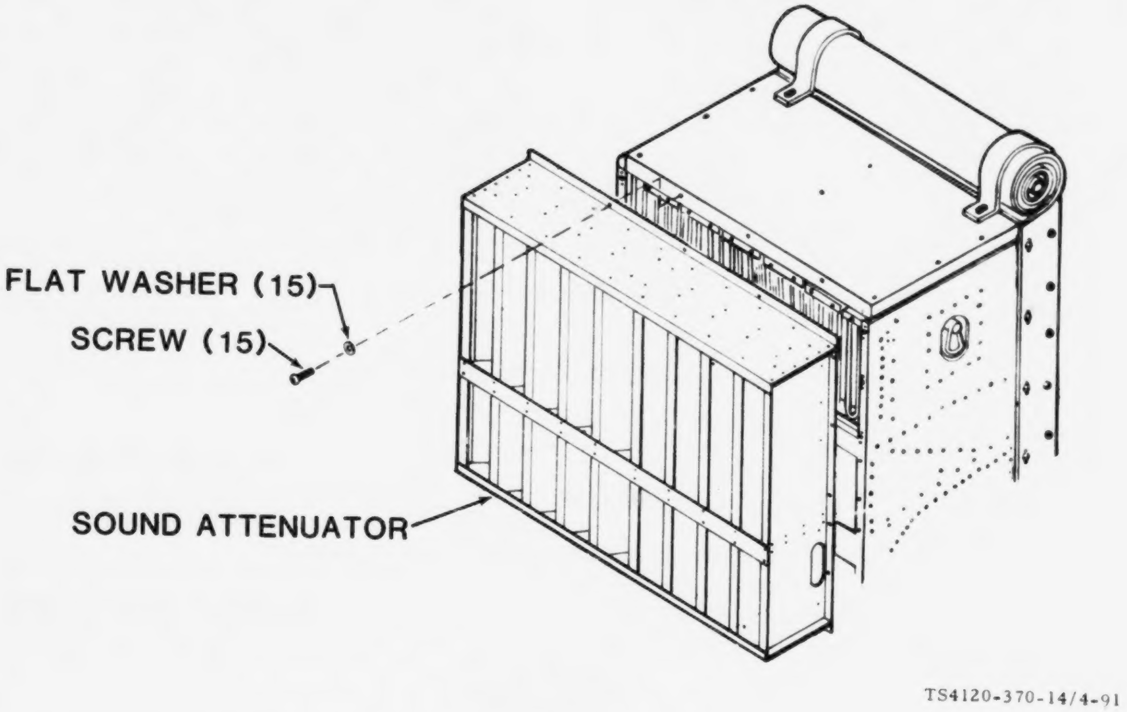

FLAT WASHER (15)
SCREW (15)
SOUND ATTENUATOR
TS4120-370-14/4-91

Figure 4-91. Sound Attenuator

a. Removal

(1) Using screwdriver, remove fifteen screws and flat washers from sound attenuator.

(2) Remove sound attenuator.

b. Inspection

(1) Check sound attenuator for accumulated dirt and obstructions that would block air flow. Clean and remove obstruction.

(2) Check that sound attenuator is not bent, cracked, punctured, or otherwise damaged. Replace if damaged.

(3) Check that gaskets are not torn or missing.

(4) Refer repairs and gasket replacement to direct support maintenance.

c. Cleaning

WARNING

> Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm^2). Do not direct compressed air against the skin. Use goggles or full face shield.

Clean with a soft bristled brush, vacuum cleaner and brush attachment, or use compressed air at 30 psi or less to blow dirt from internal baffles.

d. Installation

(1) Position sound attenuator on unit and aline mounting holes.

(2) Using screwdriver, secure sound attenuator with fifteen screws and flat washers.

Section VII PREPARATION FOR STORAGE OR SHIPMENT

4-70. PREPARATION FOR STORAGE OR SHIPMENT

a. Administrative storage of equipment. See TM 740-90-1. Administrative storage is short term storage – 1 to 45 days. It covers storage of equipment which can be readied for mission performance within 24 hours. Before placing an item in administrative storage, the next scheduled preventive maintenance checks and services should be performed, all known deficiencies corrected, and all current modification work orders applied. The administrative storage site should provide required protection from the elements and allow access for visual inspection when applicable.

(1) Unroll the fabric cover.

(2) Snap the cover in place.

b. Intermediate storage – 46 to 180 days. No special handling is required other than protection from damage and the elements.

(1) Unroll the fabric cover.

(2) Snap the cover in place.

(3) Place the air conditioner in a dry, covered area.

c. Long term or flyable storage. There is no time limit for this type of storage.

(1) Unroll the fabric cover.

(2) Snap the cover in place.

(3) Bolt the unit to a skid base, preferably the original used to ship the unit if it has been preserved.

(4) Wrap the unit with two layers of heavy plastic sheet or barrier paper.

(5) Tape and strap the wrapping in place.

(6) Mark the air conditioner per standard Army procedures.

CHAPTER 5

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

Section I REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

5-1. GENERAL

a. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

b. Test, Maintenance, and Diagnostic Equipment (TMDE) and support equipment include electrical test equipment, standard pressure and vacuum gages, vacuum pumps, and charging manifolds found as standard equipment in any direct support refrigeration shop.

c. Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM5-4120-370-24P, covering organizational, direct support, and general support maintenance for this equipment.

d. Tool Kit, Service, Refrigeration Unit, NSN 5180-00-597-1474, contains hand tools and equipment used for air conditioner maintenance. The following common items not contained in the refrigeration unit tool kit are also required for air conditioner maintenance.

Description	National Stock Number
Soldering Gun Kit	3439-00-930-1638
Vacuum Pump	4310-00-098-5272

Section II MAINTENANCE PROCEDURES

5-2. FABRIC COVER

For removal, inspection, lubrication, cleaning, and installation, see paragraph 4-18 and figure 4-22.

a. Repair. Minor rips, cuts, tears, or punctures may be repaired by applying a patch to the inside surface.

b. Replace. For damage of greater extent, or missing eyelets or snap fasteners, replace the entire cover.

5-3. OUTSIDE COVERS, PANELS, GRILLES, SCREENS, INFORMATION PLATES, AND SOUND ATTENUATOR REPAIR

a. For removal, inspection, cleaning, and installation, see the following paragraphs:

- CBR (Chemical, Biological, Radiological) Cover (para 4-19)
- Actuating Cylinder Access Cover (para 4-20)
- Service Valve Cover (para 4-21)
- Condenser Fan Cover (para 4-22)
- Connector Cover Plate (para 4-23)
- Top Panel (para 4-24)
- Lower Front Panel and Circuit Breaker Access Baffle (para 4-25)
- Condenser Outlet Grilles (para 4-26)
- Condenser Coil Guard (para 4-27)
- Conditioned Air Outlet Grille (para 4-28)
- Conditioned Air Intake Grille (para 4-29)
- Sound Attenuator (para 4-69)

b. Repair. Repairs are limited to straightening of minor dents, rewelding of broken welds, installation of loose or missing rivets, replacement of loose or missing gaskets and insulation, paint touch up, and replacement of damaged or missing name plates.

(1) Repair minor dents using standard sheet metal repair practices.

(2) Repair broken welds using standard weld repair practices.

(3) To replace loose or missing rivets:

- Drill old rivet out using a drill bit slightly smaller than the diameter of old rivet body.
- Install replacement rivet.

(4) To replace or repair gasket or insulation:

- Remove as much old gasket or insulation material as possible by pulling or scraping it away from the metal surface.

WARNING

Acetone and methyl-ethyl ketone (MEK) are flammable, and their vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use a well-ventilated area, wear gloves, and keep away from sparks or flame.

- Soften and remove old adhesive and gasket and insulation residue, using acetone or methyl-ethyl ketone (MEK) and a stiff brush.

- Coat the mating surfaces of the metal and gasket or insulation (if applicable) with adhesive, item 2, Appendix E. Let both surfaces dry until the adhesive is tacky but will not stick to fingers.

- Starting with an end, carefully attach the gasket to the metal. Press into firm contact all over.

(5) Should touch up or refinishing be necessary, see TM 43-0139, Painting Instructions for Field Use.

(6) To replace damaged or missing name plates:

- Drill rivets out using a drill bit slightly smaller than the diameter of the rivet body.

- Secure new name plate with replacement rivets.

5-4. EVAPORATOR FAN MOTOR (B3 AND B4) REPAIR

Preliminary procedure: Remove motor. (See para 4-59.)

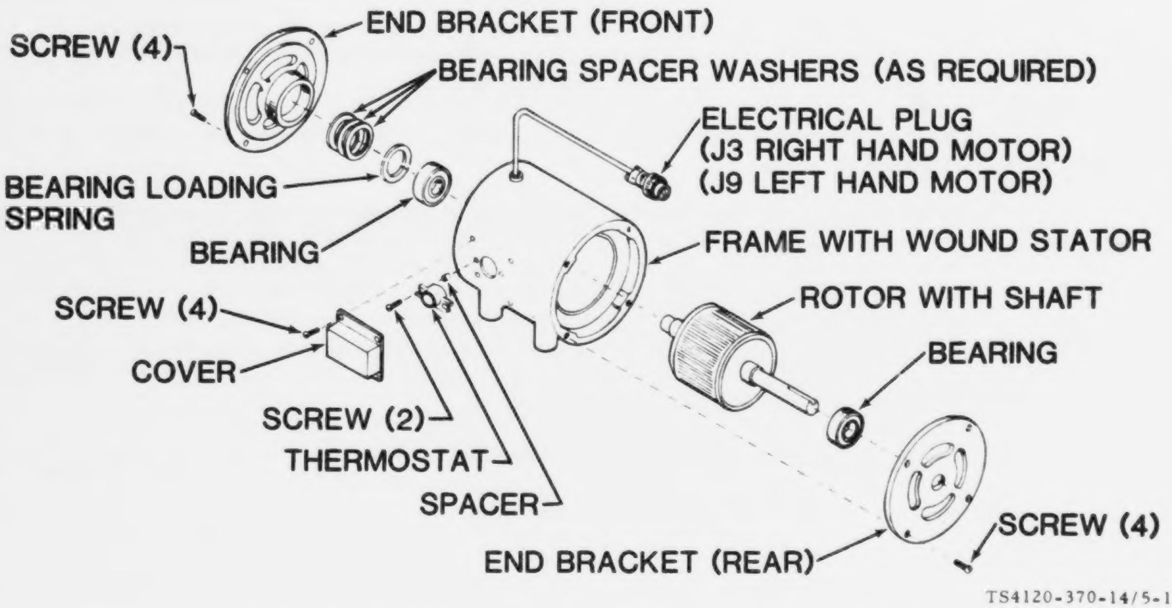

SCREW (4)
END BRACKET (FRONT)
BEARING SPACER WASHERS (AS REQUIRED)
ELECTRICAL PLUG
(J3 RIGHT HAND MOTOR)
(J9 LEFT HAND MOTOR)
BEARING LOADING SPRING
BEARING
FRAME WITH WOUND STATOR
SCREW (4)
ROTOR WITH SHAFT
COVER
BEARING
SCREW (2)
THERMOSTAT
SPACER
SCREW (4)
END BRACKET (REAR)
TS4120-370-14/5-1

Figure 5-1. Evaporator Fan Motor (B3 and B4) Internal Parts

See paragraph 4-59 for testing (installed), removal, and installation.

a. Authorized repairs. Direct support maintenance repair of the evaporator fan motor is limited to the replacement of electrical plug, thermostat (thermal overload), and bearings.

b. Disassembly. Disassemble motor only as necessary to do required repair. (See figure 5-1.)

(1) To replace electrical plug.

(a) Loosen cable clamp.

(b) Tag and unsolder leads.

(c) Remove old connector.

(d) See wiring diagram and tags and solder leads to new connector.

(e) Remove tags.

(f) Secure cable clamp.

(2) To replace thermostat (thermal protector):

(a) Using screwdriver, remove four screws from cover.

(b) Remove cover.

(c) Using screwdriver, remove two screws and spacers.

(d) Pull thermostat away from motor.

(e) Tag and disconnect leads to the thermostat.

(f) Remove old thermostat.

(g) See tags and connect leads to new thermostat.

(h) Remove tags.

(i) Using screwdriver, secure thermostat with two screws and spacer.

(j) Using screwdriver, secure cover with four screws.

(3) To replace bearings:

(a) Match-mark motor frame and both end brackets to ease reassembly.

(b) Using screwdriver, remove four screws from each end bracket.

(c) Carefully separate end brackets from motor frame. Use a brass or plastic bar and hammer and tap end brackets away from motor frame. Tap opposite sides, top, and bottom in alternating sequence to break end brackets loose.

(d) Remove end brackets.

(e) Press out or carefully drive bearings out of end brackets. Note locations and quantities of bearing spacer washers and bearing loading springs for use at reassembly if they are not damaged. They should be replaced if they are broken, nicked, or worn.

(f) Examine rotor, stator, and shafts or nicks, gouges, deformations, and evidence of overheating.

(g) Dress high metal defects in shafts with a fine file or stone. If rotor or stator are beyond repair, replace motor.

(h) Coat shaft surfaces with oil (MIL-L-2104, Grade 20) or equal.

(i) Coat the bearing cavity of each end bell with oil (MIL-L-2104, Grade 20) or equal and insert spacer washers, bearing loading springs, and bearings in same locations as removed in step (e) above.

(j) Carefully work end brackets onto shaft ends keeping the match-marks made at time of disassembly in alinement.

(k) Carefully aline mounting holes.

(l) Using screwdriver, secure each end bell with four screws. Before final tightening of screws, check for freedom of rotation by turning shaft by hand. There should be no drag or binding. Adjust as necessary and tighten screws. Check again for binding and drag.

(m) Check end-play of shaft. End-play should be 0.002-0.005 inch (0.051-0.127 mm). If end-play is not within limits, disassemble motor and add or remove bearing spacer washers to adjust.

Follow-on procedure: Install motor (See para 4-59.)

5-5. CONDENSER FAN MOTOR (B2) REPAIR

Preliminary procedure: Remove motor. (See para 4-63.)

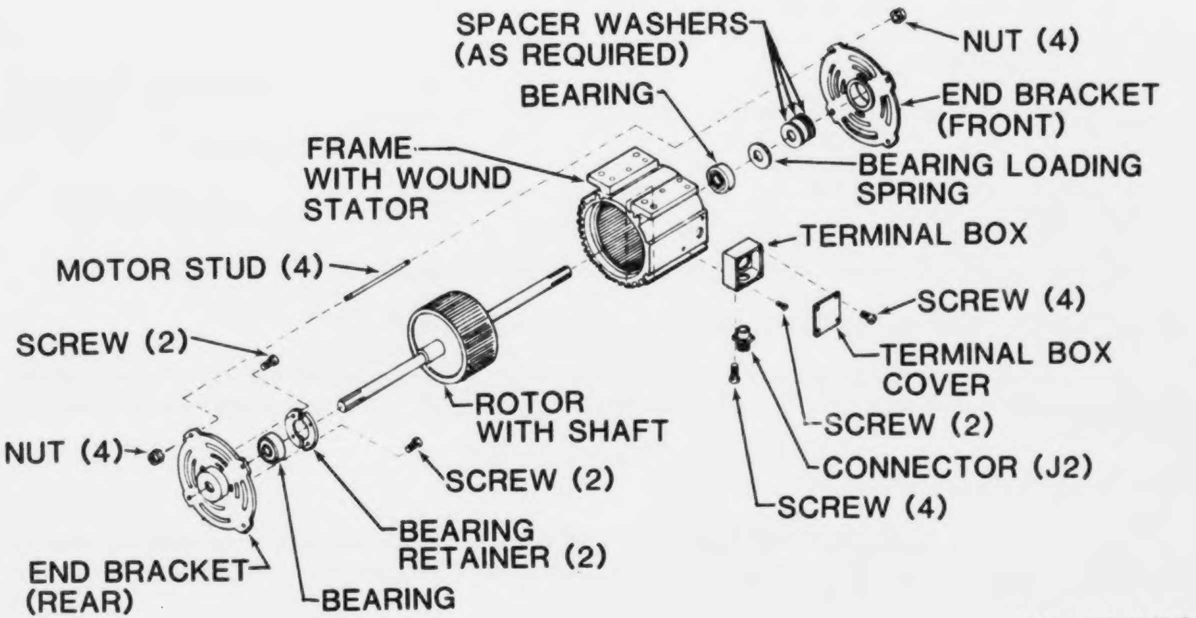

SPACER WASHERS (AS REQUIRED)
NUT (4)
BEARING
END BRACKET (FRONT)
FRAME WITH WOUND STATOR
BEARING LOADING SPRING
TERMINAL BOX
MOTOR STUD (4)
SCREW (4)
SCREW (2)
TERMINAL BOX COVER
ROTOR WITH SHAFT
SCREW (2)
NUT (4)
CONNECTOR (J2)
SCREW (2)
SCREW (4)
BEARING RETAINER (2)
END BRACKET (REAR)
BEARING
TS4120-370-14/5-2

Figure 5-2. Condenser Fan Motor (B2) Internal Parts

See paragraph 4-63 for testing (installed), removal, and installation.

a. Authorized repairs. Direct support maintenance repair of the condenser fan motor is limited to the replacement of electrical connector and bearings.

b. Disassembly. Disassemble motor only as necessary to do required repair. (See figure 5-2.)

(1) To replace connector (J2):

(a) Using screwdriver, remove four screws from terminal box cover.

(b) Remove cover.

(c) Remove four screws from connector (J2).

(d) Pull connector away from terminal box as far as wires will allow.

(e) Tag and unsolder leads.

(f) Remove old connector.

(g) See wiring diagram and tags and solder leads to new connector.

(h) Remove tags.

(i) Using screwdriver, secure connector to terminal box with four screws.

(j) Using screwdriver, secure terminal box cover to box with four screws.

(2) To replace bearings:

(a) Match-mark motor frame and both end brackets to ease reassembly.

(b) Using wrench, remove four nuts from one end of motor studs. Retain motor stud with vice grips or pliers.

(c) Carefully separate end brackets from motor frame. Use a brass or plastic bar and hammer and tap end brackets away from motor frame. Tap opposite sides, top, and bottom in alternating sequence to break end brackets loose.

(d) Remove end brackets.

(e) Press out or carefully drive bearing out of front end bracket. Remove spacer washers and bearing loading springs for use at reassembly if they are not damaged. They should be replaced if they are broken, nicked, or worn.

(f) Using screwdriver, remove four screws and two bearing retainers from rear end bracket.

(g) Remove bearing from rear end bracket.

(h) Examine rotor, stator, and shafts for ncks, gouges, deformations, and evidence of overheating.

(i) Dress high metal defects in shafts with a fine file or stone. If rotor or stator are beyond repair, replace motor.

(j) Coat shaft surfaces with oil (MIL-L-2104, Grade 20), or equal.

(k) Coat the bearing cavity of each end bell with oil (MIL-L-2104, Grade 20) or equal and insert spacer washers, loading springs, and bearings in same locations as removed in step (e) above.

(l) Insert bearing in rear end bracket and secure it with four screws and two bearing retainer halves.

(m) Carefully work end brackets onto shaft ends keeping the match-marks made at time of disassembly in alinement.

(n) Check that a nut is in place on the end of each stud.

(o) Using a wrench and vice grips or pliers, retain studs and evenly tighten the nuts on to stud ends. Before final tightening, check for freedom of rotation by turning shaft by hand. There should be no drag or binding. Adjust as necessary and tighten screws. Check again for binding and drag.

(p) Check end-play of shaft. End-play should be 0.002-0.005 inch (0.051-0.127 mm). If end-play is not within limits, disassemble motor and add or remove shims to adjust.

Follow-on procedure: Install motor. (See para 4-63.)

5-6. REFRIGERATION SYSTEM REPAIRS GENERAL

The refrigeration system must be totally discharged before any maintenance action that requires opening of the pressurized system. Leak testing and dehydrator replacement are required after any system component has been removed and replaced. The system must be evacuated before it is charged. The system must be properly charged to function properly.

WARNING

DANGEROUS CHEMICAL
(R22)
is used in this equipment.

DEATH

or severe damage may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin-eye-contact is possible. Prevent contact of refrigerant gas wth flame or hot surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

WARNING

REFRIGERANT UNDER PRESSURE
is used in the operation of this equipment.

DEATH

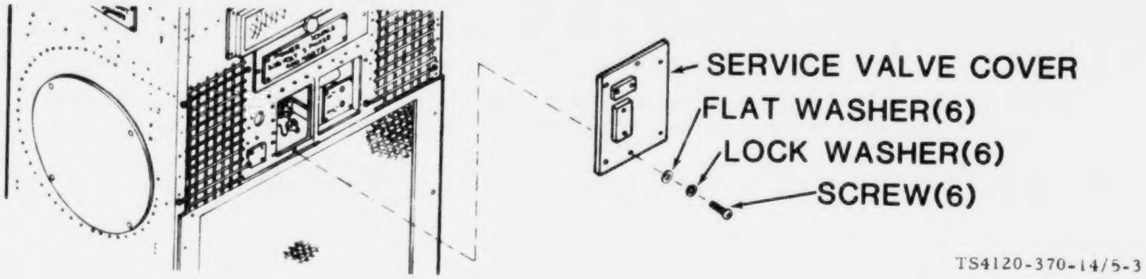
or severe injury may result if you fail to observe safety precautions.

Never use a heating torch on any part that contains refrigerant –22.

Do not let liquid refrigerant touch you, and do not inhale refrigerant gas.

5-7. DISCHARGING THE REFRIGERANT SYSTEM

a. Using screwdriver, remove six screws, lock washers, and flat washers from service valve cover.

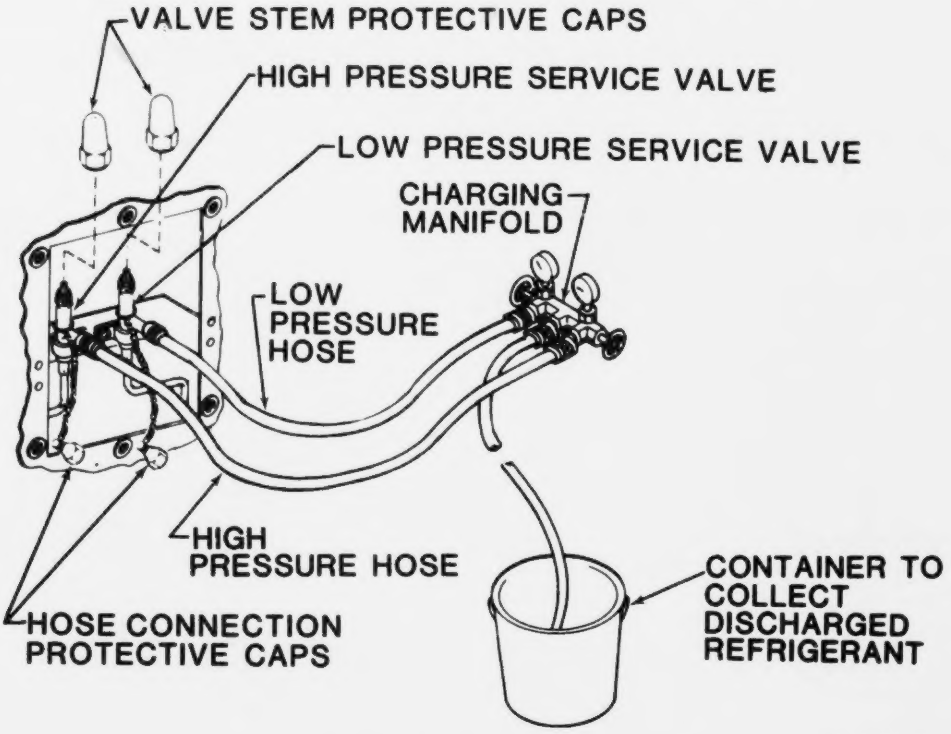

SERVICE VALVE COVER
FLAT WASHER(6)
LOCK WASHER(6)
SCREW(6)

TS4120-370-14/5-3

Figure 5-3. Service Valve Cover

b. Remove service valve cover.

c. Remove valve stem protective caps. Take care that they are not lost.


VALVE STEM PROTECTIVE CAPS
HIGH PRESSURE SERVICE VALVE
LOW PRESSURE SERVICE VALVE
CHARGING MANIFOLD
LOW PRESSURE HOSE
HIGH PRESSURE HOSE
CONTAINER TO COLLECT DISCHARGED REFRIGERANT
HOSE CONNECTION PROTECTIVE CAPS

TS4120-370-14/5-4

Figure 5-4. Discharging Refrigerant

d. Unscrew hose connection protective caps.

WARNING

Death or serious injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin-eye-contact is possible.

Prevent contact of refrigerant gas with flame or hot surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

e. Connect the charging manifold hoses to the manifold and air conditioner service valves.

f. Attach a hose assembly to the center connection of the manifold.

g. Place the open end of the center connection hose in a container that is located in a well ventilated area.

WARNING

Discharge refrigerant in an open area and **not** around an open flame.

CAUTION

Do not permit the oil to escape from the unit. If oil is escaping, close the valve(s) slightly.

Do not permit the refrigerant to escape fast enough to form ice or frost on either the lines or the valve.

h. Using a refrigeration wrench, **slowly** open the low pressure service valve to allow refrigerant gas to flow **slowly** out of the hose.

i. Using a refrigeration wrench, **slowly** open the high pressure service valve to allow refrigerant gas to flow **slowly** out of the hose.

j. Check the discharge hose for the presence of oil. Adjust (close slightly) valves if necessary to prevent oil discharge.

k. When gas stops flowing, close both service valves.

5-8. PURGING THE REFRIGERANT SYSTEM

Preliminary procedure:	Discharge the refrigerant system. (See para 5-7.)
Supplies:	Nitrogen cylinder (item 4, Appendix E)

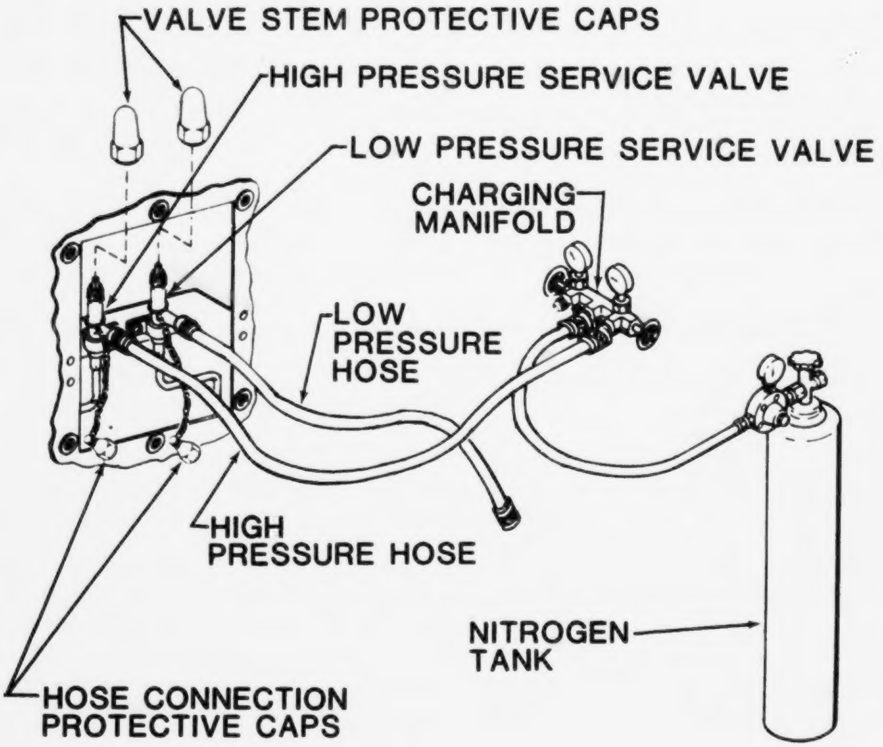
The refrigeration system must be purged with dry nitrogen, item 4, Appendix E, before any brazing or debrazing is performed on any component. A flow of dry nitrogen at the rate of less than 1-2 cfm (0.028-0.057 m^3/minute) should be continued during all brazing or debrazing operations to minimize internal oxidation and scaling.

CAUTION

Nitrogen cylinders are pressurized containers. The pressure in the cylinder can exceed 2000 psi. A nitrogen pressure regulator should be used at all times when nitrogen is used for leak check or purge operations.

CAUTION

Nitrogen is an inert gas. However, it also presents danger as a suffocant and, therefore, must also be discharged in a ventilated location.


VALVE STEM PROTECTIVE CAPS
HIGH PRESSURE SERVICE VALVE
LOW PRESSURE SERVICE VALVE
CHARGING MANIFOLD
LOW PRESSURE HOSE
HIGH PRESSURE HOSE
NITROGEN TANK
HOSE CONNECTION PROTECTIVE CAPS

TS4120-370-14/5-5

Figure 5-5. Nitrogen Purging Connection

Assuming that the system has been discharged using a manifold as described in paragraph 5-7, proceed as follows:

a. See specific component removal/repair instructions.

b. Be sure that refrigerant has been discharged. (See paragraph 5-7.)

c. Connect the center hose from the charging manifold to a nitrogen regulator and dry nitrogen tank.

d. The hose from the high pressure service valve to the charging manifold must be connected.

e. The hose from the low pressure service valve must be disconnected from the charging manifold.

f. Open both service valves on the unit.

g. Close the unused valve on the charging manifold, and open the one with the nitrogen tank hook up.

h. Open the nitrogen cylinder valve and adjust the regulator so that less than 1-2 cfm (0.028-0.057 m^3/minute) of nitrogen flows through the system.

i. Check discharge from hose attached to the low pressure charging valve to be sure that no oil is being forced out of the system.

j. Allow nitrogen to sweep through the system at the rate of less than 1-2 cfm (0.028-0.057 m^3/minute) for a minimum of 5 minutes, before starting any brazing or debrazing operation. Then allow it to continue to flow at the same rate until all brazing or debrazing operations are completed. (See paragraph 5-9 for brazing or debrazing procedures.)

k. After installation brazing operations are completed, allow nitrogen to flow for a minimum of 5 minutes.

l. Close nitrogen cylinder valve, nitrogen regulator, charging manifold valve, and both high and low pressure service valves on the unit.

m. Disconnect the hose from the nitrogen tank.

n. Assuming that all repairs are completed, go to paragraph 5-10.

5-9. BRAZING/DEBRAZING PROCEDURES

Supplies: Brazing alloy (silver) (items 5 and 6, Appendix E)
Nitrogen cylinder (item 4, Appendix E)
Brazing flux (item 7, Appendix E)
Abrasive cloth (item 8, Appendix E)
Rags (item 9, Appendix E)

a. General. All tubing in the refrigeration system is seamless copper with a bright internal finish that permits thorough cleaning and prevents entrapment of moisture or other impurities. Rigid grade copper is used for straight sections and soft grade for sections that must be bent. All interconnecting fittings, such as elbows, tees, etc., are also copper. The bodies of all valves and all connections on other components are brass. All joints, except those provided with flare fittings, are made by brazing in accordance with MIL-B-7883, except that radiographic examination is not required.

b. Filler Alloy. Grade IV or VI brazing alloy and Type B flux, as specified in MIL-B-7883, must be used for all copper to brass joints. Grade III brazing alloy may be substituted for Grade IV or VI for copper to copper joints; flux is not required for copper to copper joints.

c. Debrazing. Debraze joints for removal of refrigeration system components as follows:

WARNING

All refrigerant-22 must be discharged from the system and the entire system must be purged with dry nitrogen before beginning any debrazing operation.

(1) Determine which joints are to be debrazed. Due to the limited work space inside the air conditioner, it may be more convenient to remove a part of the interconnecting tubing with the component rather than debrazing the joints on the component itself.

(2) Before debrazing a joint on a valve, disassemble the valve to the extent possible, then wrap all but the joint with a wet rag to act as a heat sink.

WARNING

The polyurethane foam used as insulation in the air conditioner will break down to form toxic gases if exposed to the flame of a torch at brazing temperature.

(3) Protect insulation, wiring harnesses, cabinet, and other surrounding components with appropriate shields.

(4) Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of less than 1-2 cfm (0.028-0.057 m^3/minute).

(5) Apply sufficient heat uniformly around the joint to quickly melt the filler alloy. If heat is applied slowly, or only on one side, the entire component or length of tubing will be heated and filler alloy in adjacent joints may also be melted. Remove heat as soon as the joint separates.

d. Cleaning debrazed joints. All filler alloy must be cleaned from debrazed joints before reassembly. Heat each piece of the joint until the filler alloy is melted and then wipe it away with a damp cloth. Be sure no filler alloy or other debris are left inside any tubing, fitting, or component.

e. Reassembly. If tubing sections or fittings were removed with a component, debraze them from the component, clean the joints, and braze them to the new component before reinstallation.

f. Brazing. Braze joints within the air conditioner as follows:

(1) Position the component to be installed.

(2) To prepare a joint on a valve for brazing, disassemble the valve to the extent possible. Then wrap all but the joint with a wet rag to act as a heat sink.

(3) Protect insulation, wiring harnesses, and surrounding components with appropriate shields.

(4) Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of less than 1-2 cfm (0.028-0.057 m^3/minute).

(5) Apply sufficient heat uniformly around the joint to quickly raise it to a temperature that will melt the filler alloy. Remove heat as soon as brazing is completed.

5-10. LEAK TESTING THE REFRIGERANT SYSTEM

Supplies: Nitrogen cylinder (item 4, Appendix E)

Refrigerant-22 (item 10, Appendix E)

a. The entire repaired area should be thoroughly leak tested after repair or replacement of any component, before it is recharged with refrigerant-22. Leak testing is also the method for troubleshooting when a system has lost all or part of its refrigerant charge through an undetermined cause.

b. Testing Method. There are two acceptable methods for leak testing the refrigeration system.

(1) Refrigerant gas leak detector. If an electronic refrigerant gas leak detector is available, it should be used in accordance with the procedures contained in TM 9-4940-435-14, "Leak Detector, Refrigerant Gas".

NOTE

The electronic refrigerant gas leak detector is highly sensitive to the presence of a minute quantity of gas in the air, and due to this factor is quite effective in the detection of small leaks. However, due to the rapid dispersion of refrigerant gas into the surrounding air, difficulty may be encountered in pinpointing large leaks. The detector must be used in a well ventilated but draft-free area.

(2) Soap solutions. In this method, a strong solution of a liquid detergent and water is brushed onto all points of possible leakage while closely watching for the formation of bubbles.

CAUTION

If the soap solution testing method is used, thoroughly rinse with fresh water after testing is completed. A residual soap film will attract and accumulate an excessive amount of dust and dirt during operation.

c. Testing procedures. To perform leak testing by use of the electronic detector, it is necessary that the system be pressurized with a proportion of refrigerant gas. To perform leak testing by use of the soap solution method, the system may be pressurized with dry nitrogen alone.

(1) To pressurize a system that has some refrigerant charge, for either leak testing method:

(a) Remove the hose connection protective caps from the high and low pressure service valves.

(b) Connect the hoses from a charging manifold to the service valves.

NOTE

If it is possible that the problem may not be a leak and that you may not have to replace a refrigeration system component, refrigerant-22 may be substituted for the nitrogen in the following test. If nitrogen is used, you will have to discharge, evacuate, and recharge the system after this test is completed.

(c) Connect a nitrogen pressure regulator and nitrogen bottle to the center hose connection of the charging manifold.

(d) Open the unit service valves and the charging manifold valves.

(e) Open the nitrogen tank valve and pressurize the system to 350 psi (24.7 kg/cm^2).

(f) Perform leak tests.

(g) If a leak is found, discharge and purge the system and repair leak. See specific instructions for components to be removed.

(h) If a leak was not found and refrigerant-22 was used to pressurize the system, see charging instructions. (See para 5-12.)

(2) To pressurize a system that has been discharged and purged for leak testing with an electronic detector:

(a) Remove the hose connection protective caps from the high and low pressure service valves.

(b) Connect the hoses from a charging manifold to the service valves.

(c) Connect a drum of refrigerant-22 to the center hose connection of the charging manifold.

CAUTION

Connect the refrigerant-22 drum so that only **gas** will be used for pressurization.

(d) Open both unit service valves and the charging manifold valves.

(e) Open the refrigerant drum valve slightly and adjust as necessary to prevent formation of frost, and allow system pressure to build up until the gages read 40-50 psi (2.8-3.5 kg/cm^2).

(f) Close the charging manifold valves and the refrigerant drum valve.

(g) Remove the refrigerant-22 drum from the center hose connection.

(h) Connect a nitrogen regulator and cylinder of dry nitrogen to the center hose connection.

(i) Open the charging manifold valves and the nitrogen cylinder and regulator valve. Allow system pressure to build up until gages read 350 psi (24.7 kg/cm^2).

(j) Perform leak tests, then discharge and purge the system, in accordance with paragraphs 5-7 and 5-8 before performing maintenance, or before evacuating and charging the system, as appropriate.

(3) Final leak testing. Always perform a final leak test after performing any repair or replacement of components before the air conditioner is reassembled and the refrigeration system is evacuated and charged.

5-11. EVACUATING THE REFRIGERANT SYSTEM

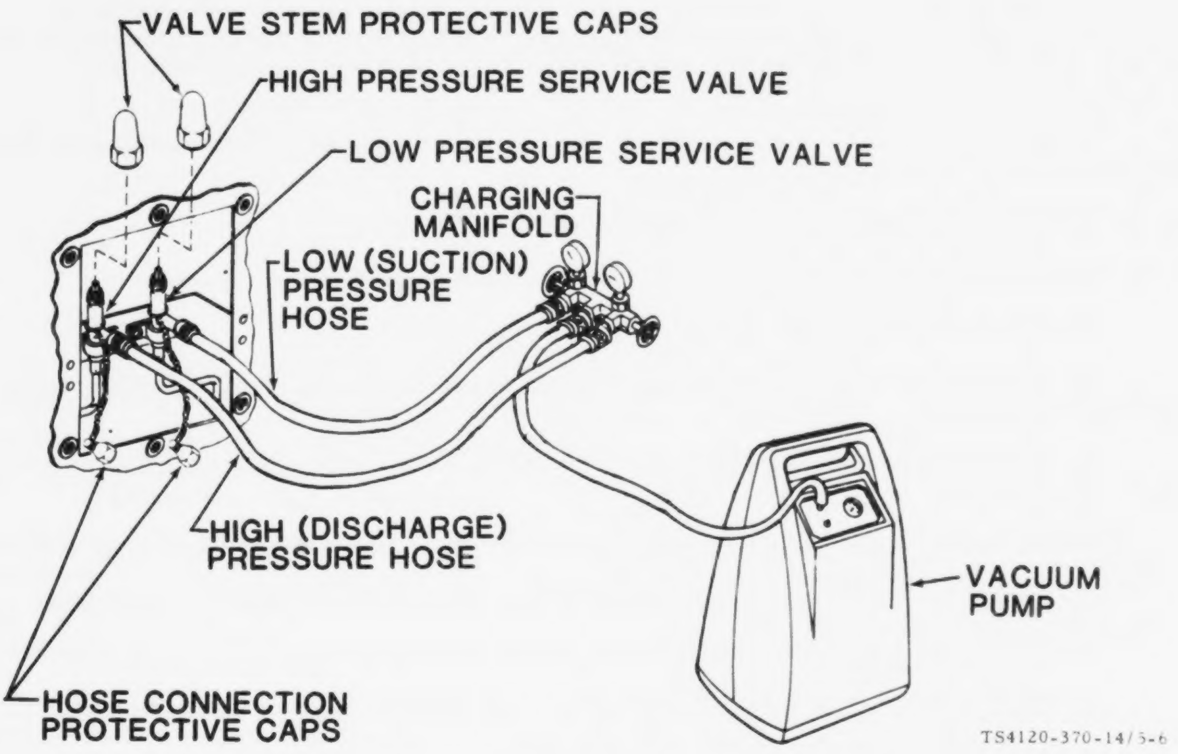

VALVE STEM PROTECTIVE CAPS
HIGH PRESSURE SERVICE VALVE
LOW PRESSURE SERVICE VALVE
CHARGING MANIFOLD
LOW (SUCTION) PRESSURE HOSE
HIGH (DISCHARGE) PRESSURE HOSE
VACUUM PUMP
HOSE CONNECTION PROTECTIVE CAPS
TS4120-370-14/5-6

Figure 5-6. Evacuation of Refrigeration System

The refrigeration system must be evacuated to remove all moisture before it is charged with refrigerant-22.

CAUTION

Don't evacuate a leaking system. The vacuum created can cause air, moisture, and dirt to enter system.

a. Check that system was leak tested and has NO LEAKS.

NOTE

If the compressor was replaced as a result of a burn out, check that compressor burn out procedures were followed. (See para 5-19.)

b. Check that new filter-drier was installed. If not, install one.

c. Check that both service valves and charging manifold valves are closed.

d. Attach hose assemblies to service valves and charging manifold valves.

e. Attach center hose assembly to vacuum pump.

f. Start vacuum pump.

g. Open charging manifold valves.

h. Open both unit service valves.

i. Run the vacuum pump until at least 29 inches of mercury, measured on the gage, is reached.

NOTE

Inability to reach 29 inches of mercury may indicate either a leak **or** a problem with the pump.

j. Continue running the pump for one more hour, while observing the gage. If the gage needle moves back and forth, you have a leak which must be located and corrected first.

k. Close both unit service valves.

l. Close charging manifold valves.

m. Stop vacuum pump.

n. Disconnect pump from center hose connection.

o. Go to paragraph 5-12, charging the refrigeration system.

5-12. CHARGING THE REFRIGERATION SYSTEM

Supplies: Dehydrator

Refrigerant-22 (Drum) (item 10, Appendix E)

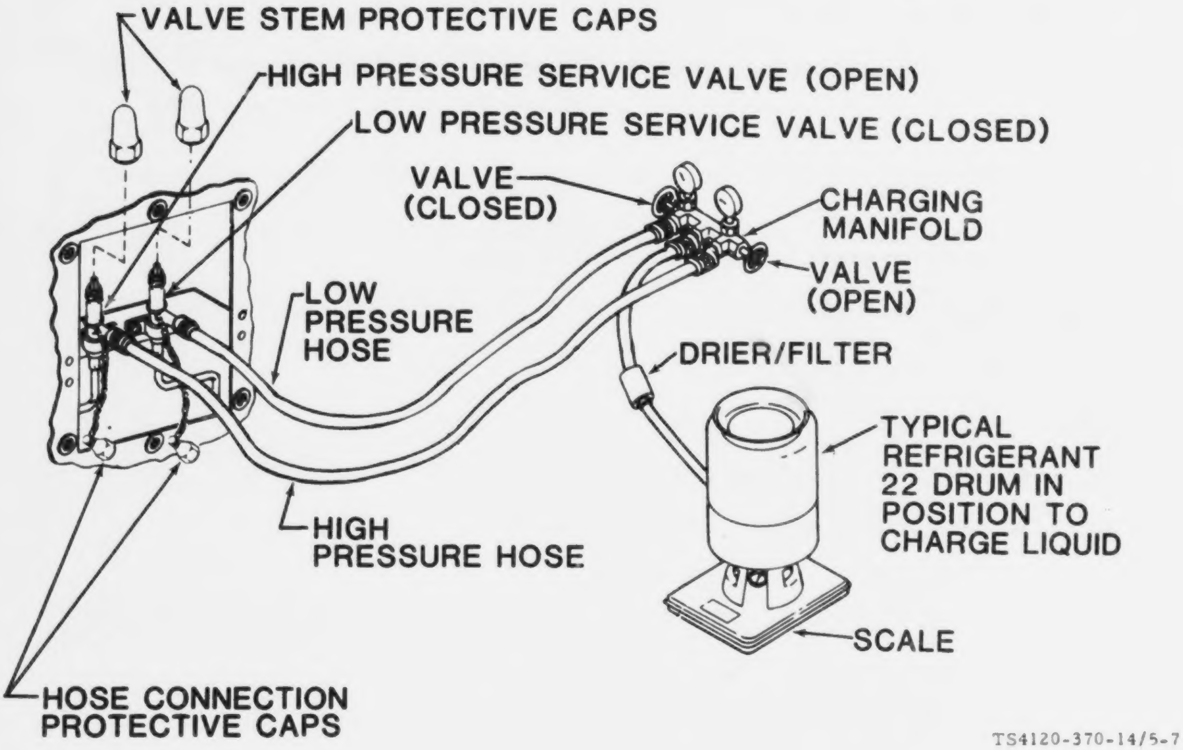

VALVE STEM PROTECTIVE CAPS
HIGH PRESSURE SERVICE VALVE (OPEN)
LOW PRESSURE SERVICE VALVE (CLOSED)
VALVE (CLOSED)
CHARGING MANIFOLD
VALVE (OPEN)
LOW PRESSURE HOSE
DRIER/FILTER
TYPICAL REFRIGERANT 22 DRUM IN POSITION TO CHARGE LIQUID
HIGH PRESSURE HOSE
SCALE
HOSE CONNECTION PROTECTIVE CAPS
TS4120-370-14/5-7

Figure 5-7. Refrigerant Charging

After the system has been satisfactorily evacuated, it must be fully charged with refrigerant-22.

CAUTION

Never introduce liquid refrigerant into the low pressure (suction) service valve.

NOTE

The system must be evacuated before charging. Use only refrigerant-22 to charge the unit.

a. Check that the hose from the low pressure service valve is connected to the compound gage side of the charging manifold. The hose from the high pressure service valve should be connected to the pressure gage side of the charging manifold.

b. Connect the center hose from the charging manifold to a well charged drum of refrigerant-22.

c. Loosen the hose connections to the two air conditioner service valves slightly.

d. Open the two charging manifold valves.

e. Open the refrigerant-22 drum valve slightly to allow a small amount of refrigerant to purge air from the hoses. Tighten the hose connections at the air conditioner service valves.

f. Close the low pressure (suction) charging manifold valve. **Never** introduce liquid refrigerant into the low pressure (suction) service valve.

g. Position the refrigerant-22 drum so that liquid will be used for charging. (Some drums must be inverted and some are equipped with a selector valve.)

h. Using accurate scales, measure and record the weight of the refrigerant-22 drum.

i. Open the refrigerant-22 drum valve.

j. Open the high pressure service valve on the air conditioner. Allow liquid refrigerant to enter the system until the drum weight has decreased by 6 pounds (2.72 kg) or until system pressure has equalized.

k. Close the refrigerant drum valve and the high pressure (discharge) manifold valve.

l. Close high (discharge) pressure service valve.

m. Connect power.

n. Press and release both pressure switch reset buttons.

NOTE

> If power has just been connected to unit, a short (30 minute maximum during very cold weather) warm up period is required. When compressor reaches a safe operating temperature, it will come on automatically if the mode selector switch is in the COOL mode.

o. Turn air conditioner on and operate in the COOL mode with the TEMPerature control thermostat set at a maximum DECREASE position.

p. If the 6 pound (2.72 kg) full charge was obtained, skip steps q through s. If the system pressure equalized prior to obtaining a full charge of 6 pounds (2.72 kg) proceed with step q.

q. Switch the refrigerant drum to the **gas** only position.

r. Be sure that the refrigerant drum has been switched to the gas position and open the refrigerant drum valve, the low (suction) pressure charging manifold valve, and the low (suction) pressure service valve on the air conditioner.

s. Monitor the weight of the refrigerant drum as the air conditioner compressor pulls additional refrigerant **gas** into the system until the full 6 pound (2.72 kg) charge is obtained. When the system is fully charged, immediately close the air conditioner low pressure service valve and refrigerant drum valve.

t. Run the air conditioner in COOL mode (with TEMPerature control thermostat in full DECREASE position) for 15 minutes.

CAUTION

Do not skip the next step.

u. After 15 minutes, observe the sight glass on back of condenser section.

- **Green center** means the refrigerant moisture content is acceptable.
- **Yellow center** means there is too much moisture in the system. It **must be discharged, evacuated, and charged again.**
- **Milky white or bubbly** liquid means the system has a low charge.
- **Clear bubble-free** liquid around the center means the system is fully charged.

v. If charge is **low,** add **gas** refrigerant.

(1) Be sure that drum is switched to **gas** position. Open the drum valve and the air conditioner low pressure service valve.

(2) Continue to charge until sight glass is clear and bubble-free.

(3) Close the air conditioner low pressure service valve and the refrigerant drum valve.

w. Check air conditioner for proper cooling. There should be at least a 15° temperature difference between evaporator discharge air and the inlet air. Turn the mode selector switch to OFF.

x. Assure that the high and low pressure air conditioner service valves are closed, and remove the charging manifold hoses from the air conditioner service valves.

y. Install the valve stem and hose connection protective caps.

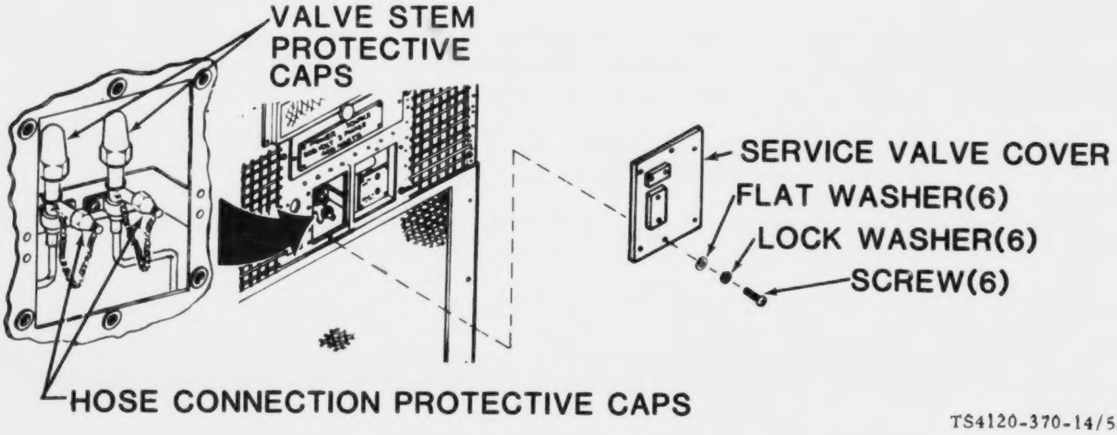


Figure 5-8. Service Valve Caps and Cover

z. Using screwdriver, secure service valve cover with six screws, lock washers, and flat washers.

5-13. REFRIGERANT PRESSURE CHECK

Except in cases where it is obvious that the refrigerant charge has been lost, the first step in troubleshooting problems in the refrigeration system should be to check discharge and suction pressures under operating conditions. Check pressures as follows:

a. Turn the mode selector switch to OFF.

b. Using screwdriver, remove six screws, lock washers, and flat washers from service valve cover.

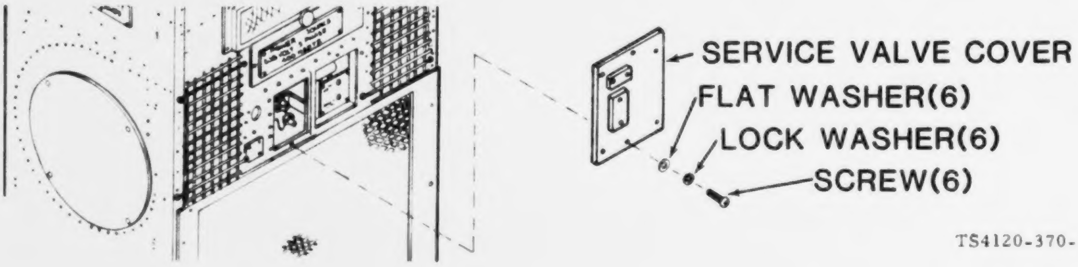


Figure 5-9. Service Valve Cover

c. Remove valve stem and hose connection protective caps from service valves. Take care that valve stem caps are not lost.

d. Connect individual pressure gages, or a refrigeration charging manifold and hoses to the high (discharge) and low (suction) service valves.

CAUTION

Take care that only a very small amount of refrigerant is allowed to escape during hose purging.

e. Loosen hose connections at gages or charging manifold.

f. Open high (discharge) pressure service valve **slightly** to purge air from hose. Tighten high pressure hose connection at gage fitting as soon as a hissing sound is heard.

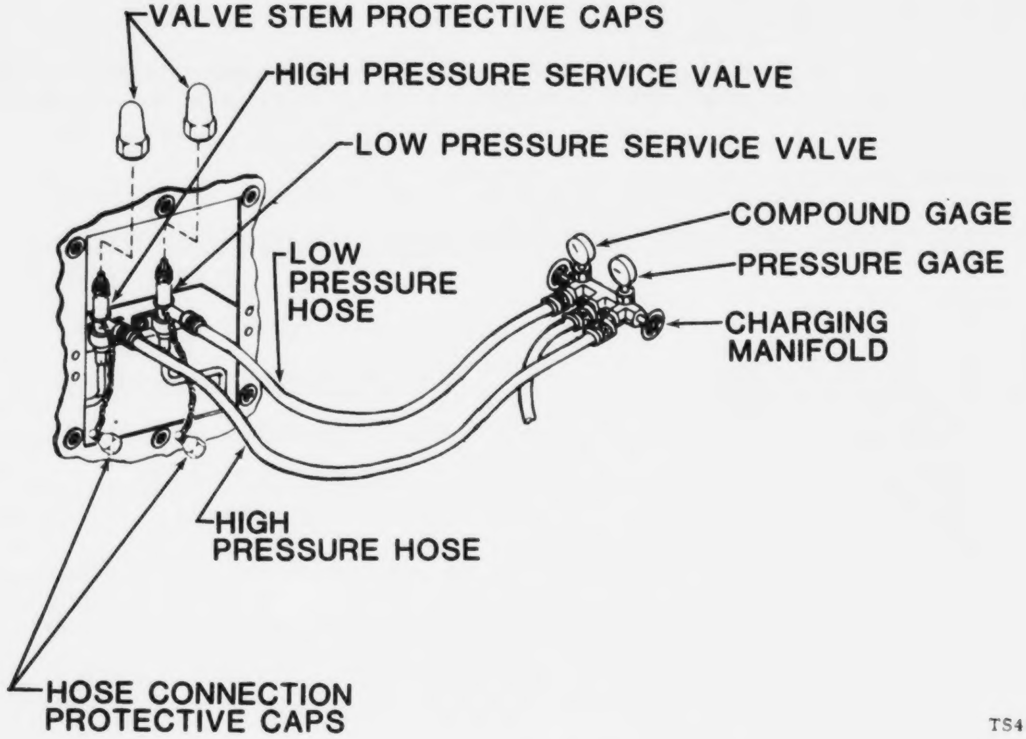
g. Open low (suction) pressure service valve **slightly** to purge air from hose. Tighten low pressure hose connection at gage fitting as soon as a hissing sound is heard.

h. Open the low (suction) and high (discharge) service valves.

i. Both gages should read the same. Check the reading with the appropriate column in table 5-1. If the system is even partially charged, the pressure should be approximately equal to that shown in the table for the appropriate ambient temperature. If the pressure is considerably less than shown in the table, the system does not contain enough refrigerant to continue the pressure check; go to leak testing. (See para 5-10.)

j. Turn the mode selector switch to the COOL mode with the TEMPerature control thermostat in the full DECREASE setting for a few minutes.

k. With the unit operating, allow gages to stabilize. Take readings of the two gages.


VALVE STEM PROTECTIVE CAPS
HIGH PRESSURE SERVICE VALVE
LOW PRESSURE SERVICE VALVE
COMPOUND GAGE
PRESSURE GAGE
CHARGING MANIFOLD
LOW PRESSURE HOSE
HIGH PRESSURE HOSE
HOSE CONNECTION PROTECTIVE CAPS

TS4120-370-14/5-10

Figure 5-10. Pressure Test Connection

(1) If the discharge and suction pressures are at, or near the same value, a pressure equalizer solenoid valve malfunction or an internal compressor failure is indicated.

(2) If discharge pressure is low and suction pressure is normal, (see table 5-2) a low refrigerant charge is indicated.

(3) If discharge pressure is normal and suction pressure is either high or low, failure or maladjustment of the pressure regulator valve is indicated.

(4) If discharge pressure is high and suction pressure is normal, a malfunction of quench valve is indicated.

l. When pressure tests are completed, proceed with the maintenance action indicated.

m. Turn unit OFF.

n. Close both service valves on unit.

o. Remove gages or service manifold hoses from service valves.

p. Install the valve stem and hose connection protective caps.

q. Using screwdriver, secure service valve cover with six screws, lock washers, and flat washers.

Table 5-1. Pressure-Temperature Relationship of Saturated Refrigerant-22

Temperature		Pressure		Temperature		Pressure	
Deg F	Deg C	Psig	kg/em^2	Deg F	Deg C	Psig	kg/em^2
10	-12.3	32.93	2.315	66	18.9	114.2	8.029
12	-11.1	34.68	2.439	68	20.0	118.3	8.318
14	-10.0	36.89	2.593				
16	-8.9	38.96	2.739	70	21.1	122.5	8.612
18	-7.8	41.09	2.889	72	22.2	126.8	8.915
				74	23.3	131.2	9.225
20	-6.6	43.28	3.043	76	24.4	135.7	9.541
22	-5.5	45.23	3.180	78	25.6	140.3	9.864
24	-4.3	47.85	3.364				
26	-3.4	50.24	3.532	80	26.7	145.0	10.195
28	-2.2	52.70	3.705	82	27.8	149.8	10.522
				84	28.9	154.7	10.877
30	-1.1	55.23	3.883	86	30.0	159.8	11.236
32		57.83	4.066	88	31.1	164.9	11.594
34	1.1	60.51	4.254				
36	2.2	63.27	4.448	90	32.2	170.1	11.960
38	3.3	66.11	4.648	92	33.3	175.4	12.332
				94	34.5	180.9	12.719
40	4.4	69.02	4.853	96	35.6	186.5	13.113
42	5.5	71.99	5.062	98	36.7	192.1	13.506
44	6.6	75.04	5.276				
46	7.7	78.18	5.497	100	37.8	197.9	13.914
48	8.8	81.40	5.723	102	38.9	203.8	14.329
				104	40.0	209.9	14.758
50	10.0	84.70	5.955	106	41.1	216.0	15.187
52	11.1	88.10	6.257	108	42.2	222.3	15.630
54	12.2	91.5	6.433				
56	13.3	95.1	6.686	110	43.3	228.7	16.080
58	14.5	98.8	6.947	112	44.4	235.2	16.537
				114	45.6	241.9	17.008
60	15.6	102.5	7.206	116	46.7	248.7	17.486
62	16.7	106.3	7.474	118	47.8	255.6	17.971
64	17.8	110.2	7.748				

Table 5-2. Normal Operating Pressures (in full cooling DECREASE mode)

Temperatures	Pressure Range (psig)			
Outdoor ambient	50F (10C)	75F (24C)	100F (38C)	120F (49C)
90F (32C) Return Air to Unit (Dry Bulb)	55-65 Suction 125-160 Discharge	59-70 Suction 175-210 Discharge	60-75 Suction 255-295 Discharge	75-90 Suction 370-410 Discharge
80F (27C) Return Air to Unit (Dry Bulb)	58-65 Suction 120-155 Discharge	58-70 Suction 170-205 Discharge	60-75 Suction 250-290 Discharge	65-75 Suction 370-410 Discharge

5-14. DEHYDRATOR (FILTER DRIER)

Preliminary procedure: Remove lower front panel. (See para 4-25.)

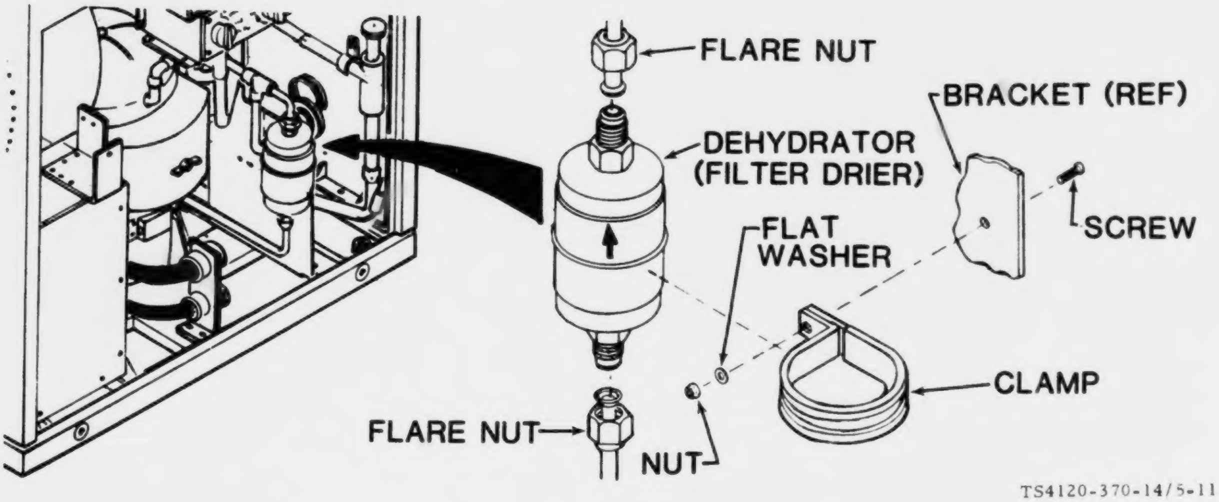

FLARE NUT
BRACKET (REF)
DEHYDRATOR (FILTER DRIER)
SCREW
FLAT WASHER
CLAMP
FLARE NUT
NUT
TS4120-370-14/5-11

Figure 5-11. Dehydrator (Filter Drier)

NOTE

The dehydrator must be replaced each time the refrigeration system has been opened. It should be installed just before unit is leak tested.

a. Inspection

(1) Check for general condition and signs of leakage. If leakage is suspected, leak test per paragraph 5-10.

(2) Check that mounting clamp is secure.

b. Removal

(1) Discharge the refrigerant system per paragraph 5-7.

(2) Using wrench, loosen and disconnect flare nuts.

(3) Using screwdriver, remove screw, flat washer, nut, and clamp.

(4) Remove dehydrator. Note direction of flow arrow for installation.

c. Installation

CAUTION

Replacement dehydrators are packed with sealing caps on the flare fittings to prevent moisture contamination of the desiccant filtering media. Remove these caps immediately prior to installation. Never install a dehydrator from which caps have been removed for an extended or unknown period of time.

(1) Place clamp on dehydrator.

(2) Place clamp and dehydrator in unit. Be sure that flow arrow is pointing up.

(3) Using screwdriver, secure clamp with screw, flat washer, and nut.

(4) Using wrench tighten both flare nuts.

(5) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

(6) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

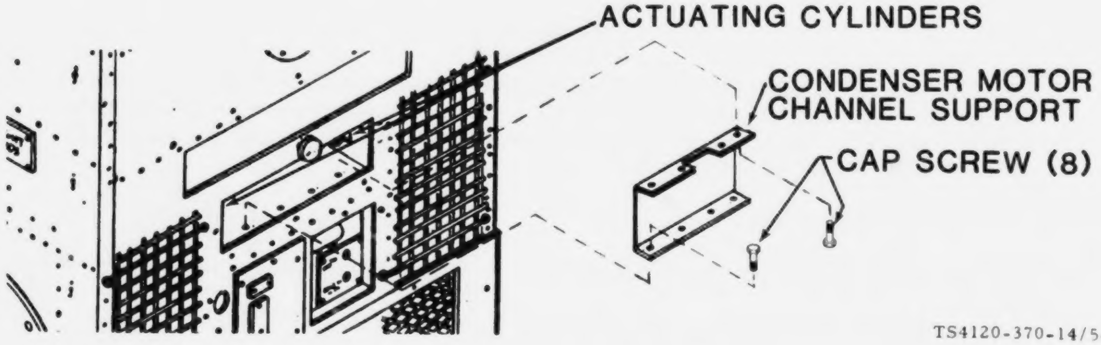
Follow-on procedure: Install lower front panel. (See para 4-25.)

5-15. ACTUATING CYLINDERS AND CONDENSER AIR OUTLET DAMPER LINKAGE

Preliminary procedure: Remove actuating cylinder access cover. (See para 4-20.)

a. Access

(1) Using wrench, remove eight cap screws from condenser motor channel support.


ACTUATING CYLINDERS
CONDENSER MOTOR CHANNEL SUPPORT
CAP SCREW (8)

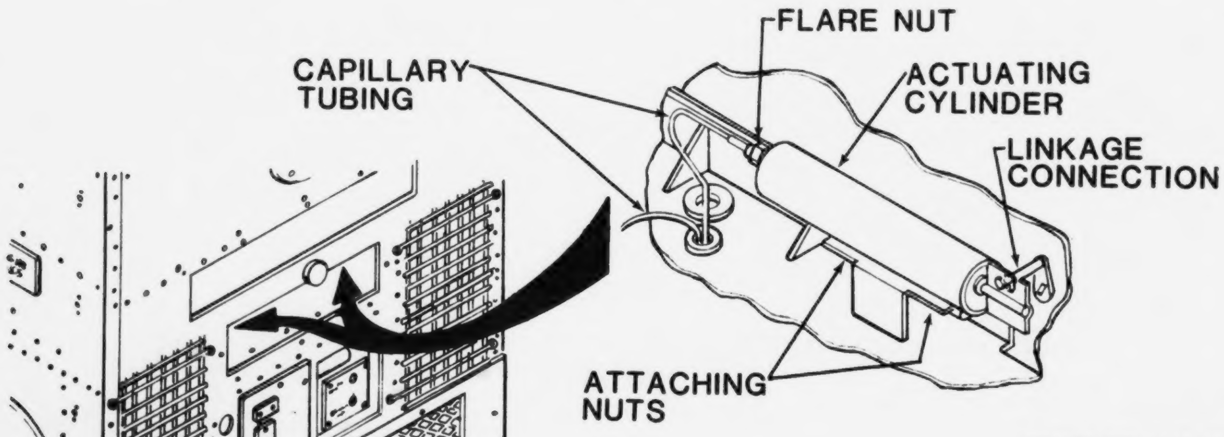
TS4120-370-14/5-12

Figure 5-12. Condenser Motor Channel Support

(2) Remove condenser motor channel support.

b. Inspection

(1) Check actuating cylinder for signs of leakage. If leakage is suspected, leak test per paragraph 5-10.


FLARE NUT
CAPILLARY TUBING
ACTUATING CYLINDER
LINKAGE CONNECTION
ATTACHING NUTS

TS4120-370-14/5-13

Figure 5-13. Actuating Cylinder Inspection

(2) Check that attaching nuts, linkage connection, and flare nut are in place and secure. Tighten loose parts and replace if missing.

(3) Check that capillary tubing is not kinked or mashed closed. Replace if damaged.

c. Removal

(1) Discharge the refrigerant system per paragraph 5-7.

(2) Using wrench, loosen flare nut and slip away from cylinder flare connection.

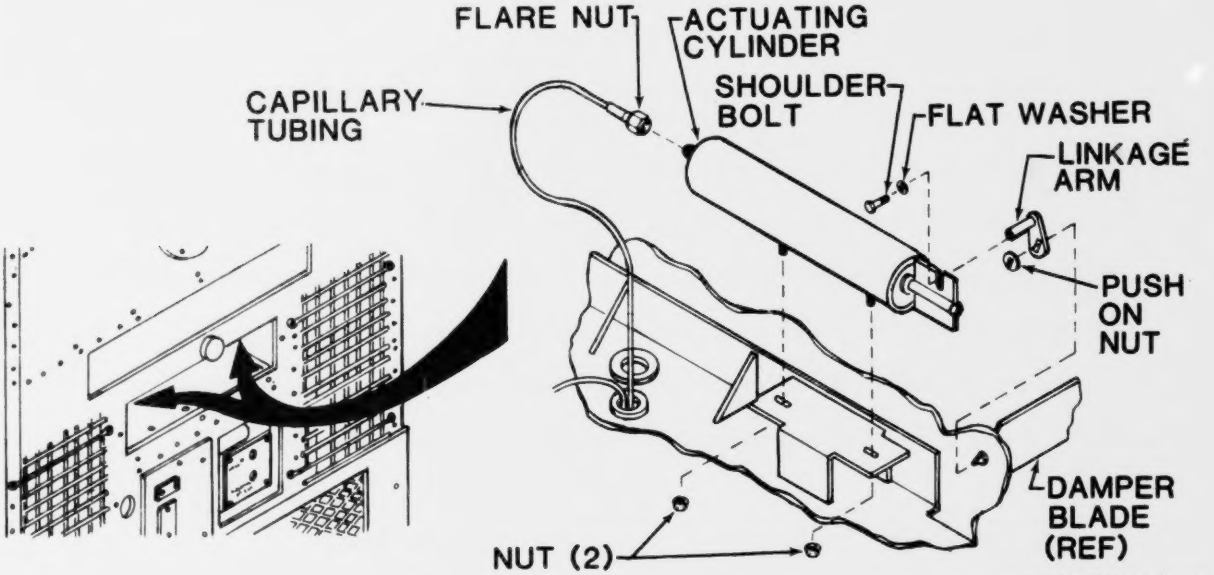

FLARE NUT
ACTUATING CYLINDER
CAPILLARY TUBING
SHOULDER BOLT
FLAT WASHER
LINKAGE ARM
PUSH ON NUT
DAMPER BLADE (REF)
NUT (2)
TS4120-370-14/5-14

Figure 5-14. Actuating Cylinder

(3) Using wrench, remove shoulder bolt and flat washer from linkage arm.

(4) Using wrench, remove two nuts from actuator mounting studs.

(5) Remove actuating cylinder.

(6) If the other actuating cylinder is to be removed, repeat steps (1) through (5).

d. Installation

(1) Position actuating cylinder and insert mounting studs through bracket.

(2) Using wrench, secure cylinder to bracket with two lock nuts.

(3) Using wrench, connect and tighten flare nut.

(4) Check that linkage arm is in place and held in place by push on nut. Install replacement parts if missing, loose, or broken.

NOTE

The linkage arms used on opposite sides of the unit are **not** the same. Take care that correct part is ordered, and properly installed when replacement is necessary.

(5) Using wrench, install shoulder bolt and flat washer through actuator end and into threaded hole in linkage arm.

NOTE

The shouldered portion of the shoulder bolt should prevent tight clamping of actuator end slot. This allows bolt to slide up and down in slot.

(6) If the other actuating cylinder was removed, repeat steps (1) through (5).

(7) Replace the dehydrator. (See para 5-14.)

(8) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

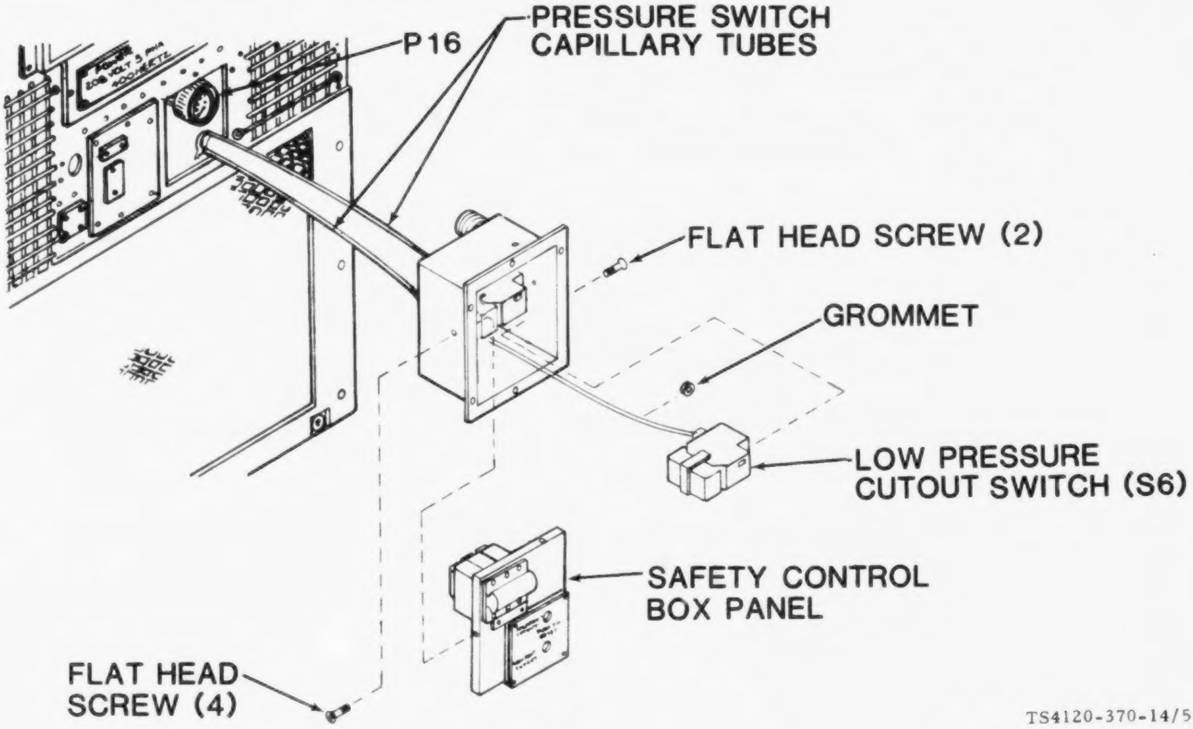
(9) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

(10) Using wrench, secure condenser motor channel support with eight cap screws.

Follow-on procedure: Install actuating cylinder access cover. (See para 4-20.)

5-16. LOW PRESSURE CUTOUT SWITCH (S6)

Preliminary procedure: Pull safety control box out far enough to gain access to panel mounting screws. (See para 4-64.)


P16
PRESSURE SWITCH CAPILLARY TUBES
FLAT HEAD SCREW (2)
GROMMET
LOW PRESSURE CUTOUT SWITCH (S6)
SAFETY CONTROL BOX PANEL
FLAT HEAD SCREW (4)

TS4120-370-14/5-15

Figure 5-15. Low Pressure Cutout Switch (S6)

a. Inspection/Test

(1) Check to see that power has been disconnected.

(2) Using screwdriver, remove four flat head screws from safety control box panel.

(3) Carefully pull panel from safety control box far enough to gain access to pressure switch terminals. Remove protective clip-on cap.

(4) Check that mounting screws and terminal attachment screw are in place and secure. Tighten if loose. Replace if missing.

(5) Check that capillary line is not kinked, mashed, or broken. Replace switch if capillary line is damaged.

NOTE

Check that refrigerant system is properly charged. (See para 5-12.)

(6) Press and release the reset button to be sure switch is not tripped.

(7) Use a continuity tester or multimeter to check for continuity between terminals 1 and 2 on switch. If there is continuity, the switch is properly closed. If no continuity is found, switch must be replaced.

b. Removal

(1) Discharge the refrigerant system per paragraph 5-7.

(2) Using screwdriver, remove two flat head screws from pressure switch.

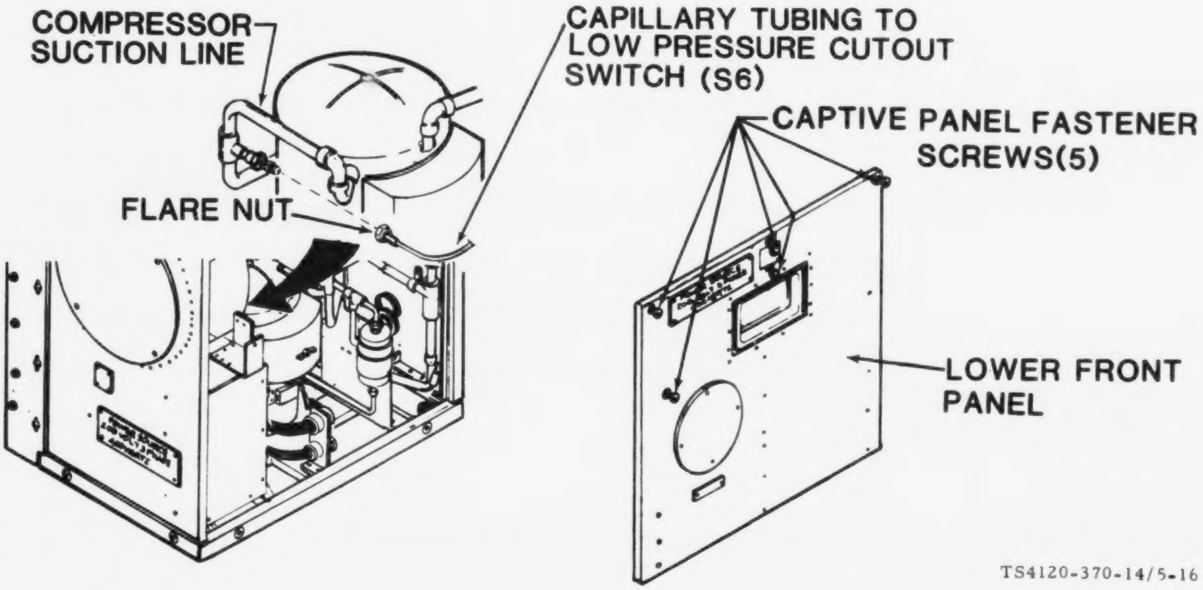

COMPRESSOR SUCTION LINE
CAPILLARY TUBING TO LOW PRESSURE CUTOUT SWITCH (S6)
CAPTIVE PANEL FASTENER SCREWS(5)
FLARE NUT
LOWER FRONT PANEL
TS4120-370-14/5-16

Figure 5-16. Flare Nut Disconnect for Low Pressure Cutout Switch (S6)

WARNING

Check to be sure that refrigerant has been discharged.

(3) Using wrench, loosen and disconnect pressure switch capillary tubing flare nut from compressor suction line.

(4) Remove protective clip-on cap.

(5) Tag and disconnect wire leads with pressure switch.

(6) Remove pressure switch, split grommet, and capillary with flare nut from unit.

c. Installation

(1) Insert capillary with flare nut through hole in back of safety control box and install split grommet.

(2) Using screwdriver, secure pressure switch to box with two flat head screws.

(3) See tags and wiring diagram (fig. 4-20) and connect wire leads.

(4) Remove tags and install protective clip-on cap.

(5) Carefully feed capillary tubing down to flare connection on suction line.

(6) Using wrench, connect flare nut.

(7) Carefully coil excess capillary tubing and tape in place to eliminate vibration.

(8) Replace the dehydrator. (See para 5-14.)

(9) Leak test all newly connected joints and those in the repaired area. (See para 5-10.)

(10) Using screwdriver, secure the safety control box panel to the box with four flat head screws.

(11) Insert safety control box into unit taking care that capillary tubing is not damaged.

(12) Connect P16 connector and harness to J16 connector on back side of box.

(13) Using screwdriver, secure the safety control box to the unit with six screws, lock washers, and flat washers.

(14) Set the bottom of the lower front panel in position so that the flange is inside the lip on the cabinet base.

(15) Push the top of the panel back into position.

(16) Using screwdriver, tighten the five captive panel screws in the lower front panel.

(17) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

Follow-on procedures:

1. Connect power.
2. Press and release pressure switch buttons to be sure they are not tripped.

5-17. HIGH PRESSURE CUTOUT SWITCH (S5)

Preliminary procedure: Pull safety control box out far enough to gain access to panel mounting screws. (See para 4-64.)

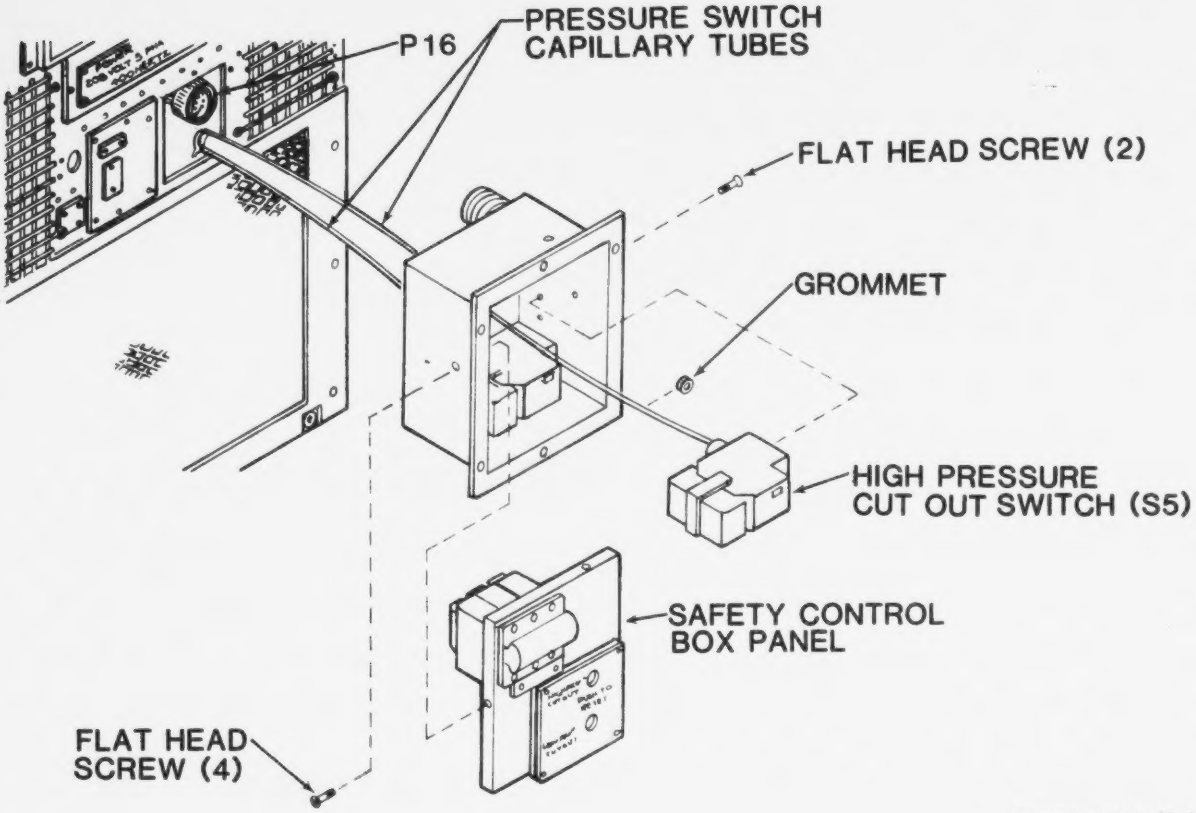

P16
PRESSURE SWITCH CAPILLARY TUBES
FLAT HEAD SCREW (2)
GROMMET
HIGH PRESSURE CUT OUT SWITCH (S5)
SAFETY CONTROL BOX PANEL
FLAT HEAD SCREW (4)
TS4120-370-14/5-17

Figure 5-17. High Pressure Cutout Switch (S5)

a. Inspection/Test

(1) Check to see that power has been disconnected.

(2) Using screwdriver, remove four flat head screws from safety control box panel.

(3) Carefully pull panel from safety control box far enough to gain access to pressure switch terminals.

(4) Check that mounting screws and terminal attachment screws are in place and secure. Tighten if loose. Replace if missing.

(5) Check that capillary line is not kinked, mashed, or broken. Replace switch if capillary line is damaged.

(6) Press and release the reset button to be sure switch is not tripped.

(7) Use a continuity tester or multimeter to check for continuity between terminals 1 and 2 on switch. If there is continuity, the switch is properly closed. If no continuity is found, switch must be replaced.

b. Removal

(1) Discharge the refrigerant system per paragraph 5-7.

(2) Using screwdriver, remove two flat head screws from pressure switch.

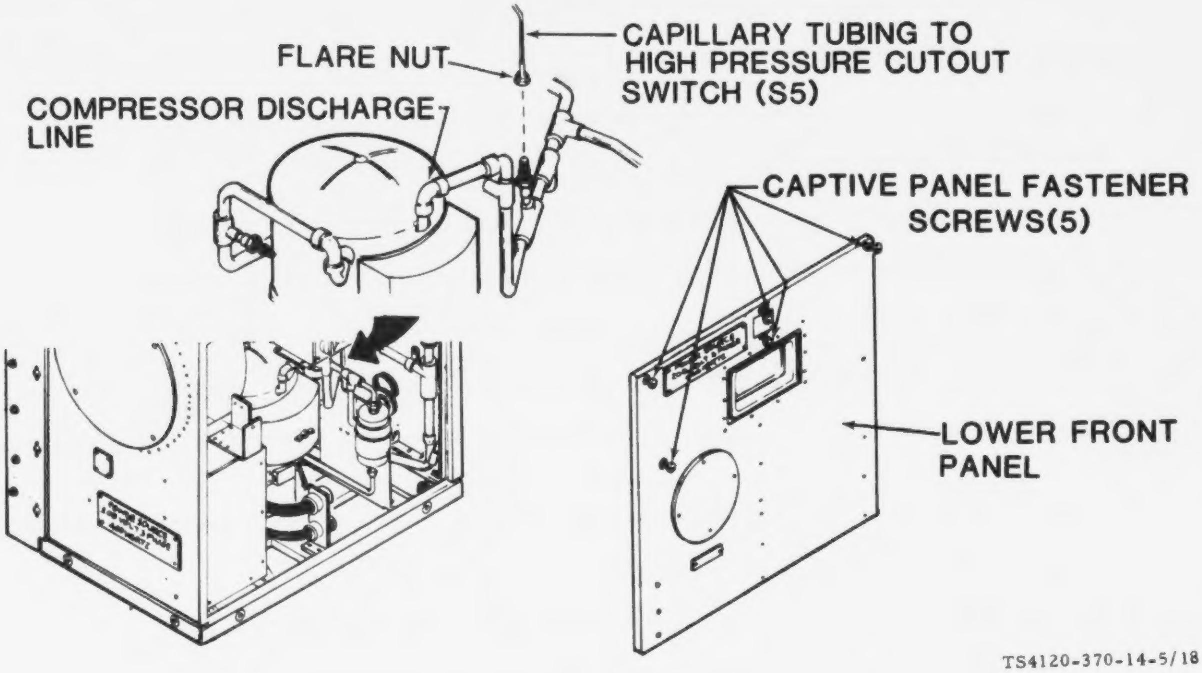

FLARE NUT
CAPILLARY TUBING TO HIGH PRESSURE CUTOUT SWITCH (S5)
COMPRESSOR DISCHARGE LINE
CAPTIVE PANEL FASTENER SCREWS(5)
LOWER FRONT PANEL
TS4120-370-14-5/18

Figure 5-18. Flare Nut Disconnect for High Pressure Cutout Switch (S5)

WARNING

Check to be sure that refrigerant has been discharged.

(3) Using wrench, loosen and disconnect pressure switch capillary tubing flare nut from compressor discharge line.

(4) Remove protective clip-on cap.

(5) Tag and disconnect wire leads from pressure switch.

(6) Remove pressure switch, split grommet, and capillary with flare nut from unit.

c. Installation

(1) Insert capillary with flare nut through hole in back of safety control box and install split grommet.

(2) Using screwdriver, secure pressure switch to box with two flat head screws.

(3) See tags and wiring diagram (fig. 4-20) and connect wire leads.

(4) Remove tags and protective clip-on cap.

(5) Carefully feed capillary tubing down to flare connection on discharge line.

(6) Using wrench, connect flare nut.

(7) Carefully coil excess capillary tubing and tape in place to eliminate vibration.

(8) Replace the dehydrator. (See para 5-14.)

(9) Leak test all newly connected joints and those in the repaired area. (See para 5-10.)

(10) Using screwdriver, secure the safety control box panel to the box with four flat head screws.

(11) Insert safety control box into unit taking care that capillary tubing is not damaged.

(12) Connect P16 connector and harness to J16 connector on back of box.

(13) Using screwdriver, secure the safety control box to the unit with six screws, lock washers, and flat washers.

(14) Set the bottom of the lower front panel in position so that the flange is inside the lip on the cabinet base.

(15) Push the top of the panel back into position.

(16) Using screwdriver, tighten the five captive panel screws in the lower front panel.

(17) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

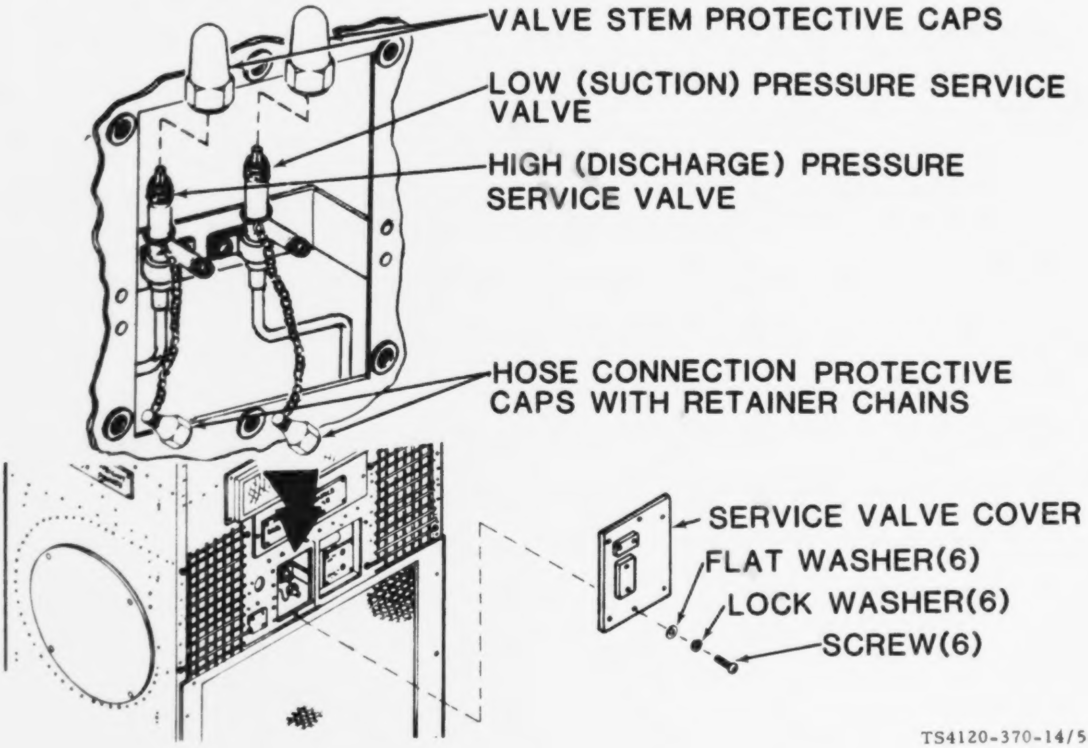
Follow-on procedures:

1. Connect power.
2. Press and release pressure switch reset buttons to be sure they are not tripped.

5-18. SERVICE VALVES

a. Access

(1) Using screwdriver, remove six screws, lock washers, and flat washers from service valve cover.


VALVE STEM PROTECTIVE CAPS
LOW (SUCTION) PRESSURE SERVICE VALVE
HIGH (DISCHARGE) PRESSURE SERVICE VALVE
HOSE CONNECTION PROTECTIVE CAPS WITH RETAINER CHAINS
SERVICE VALVE COVER
FLAT WASHER(6)
LOCK WASHER(6)
SCREW(6)

TS4120-370-14/5-19

Figure 5-19. Service Valves

(2) Remove cover.

b. Inspection

(1) Check that caps are in place and that threaded connection ends are not damaged. Replace if missing or damaged.

(2) Check for signs of leakage. Leak test per para 5-10 if leak is suspected.

c. Removal

(1) Using screwdriver, remove screw, flat washer, nut, and clamp.

(2) Discharge the refrigerant system. (See para 5-7.)

NOTE

If valve is to be reused, internal parts should be removed prior to debrazing.

(3) While purging the system with nitrogen, debraze the valve from the tubing. (See para 5-8 and 5-9.)

(4) Remove the valve.

d. Installation

(1) Position valve in unit.

NOTE

New valves are normally shipped with internal parts loosely assembled. Remove internal parts prior to brazing. Be sure that valve is reassembled after brazing is complete.

(2) While purging the system with nitrogen, braze the tubing joints. (See para 5-8 and 5-9.)

(3) Using screwdriver, secure valve with screw, flat washer, nut, and clamp.

(4) Replace the dehydrator. (See para 5-14.)

(5) Leak test the newly connected joints and all connections in those areas. (See para 5-10.)

(6) Evacuate and charge the system. (See para 5-11 and 5-12.)

(7) Check that valve stem and hose connection protective caps are in place on valves.

(8) Using screwdriver, secure service valve cover with six screws, lock washers, and flat washers.

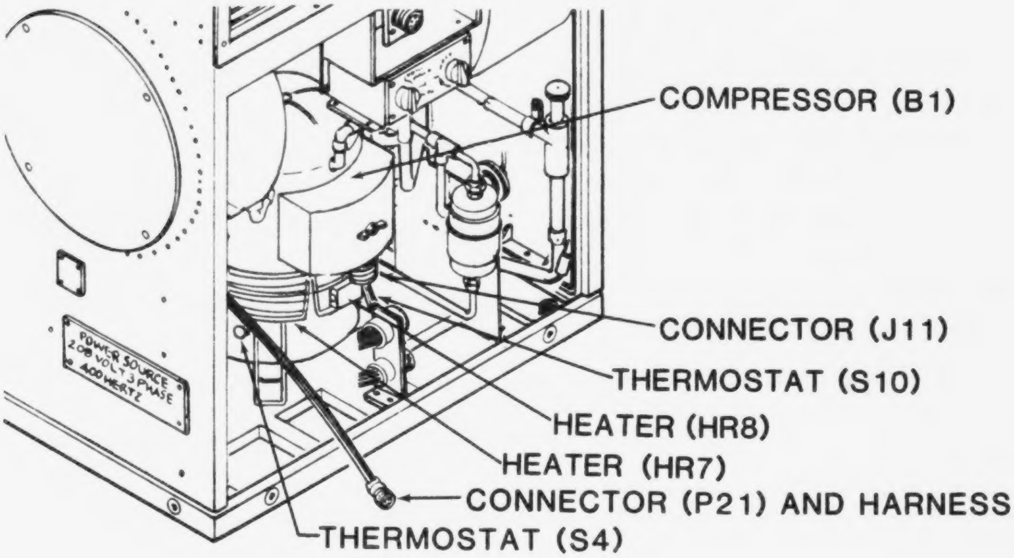
5-19. COMPRESSOR (B1)

Preliminary procedures:

1. Remove lower front panel. (See para 4-25.)
2. Remove junction box. (See para 4-44.)

The compressor and motor assembly are hermetically sealed in a metal canister and are not repairable. The following items may be replaced without opening the refrigerant system.

- Connector (J11)
- Heater (HR7)
- Thermostat (S4)
- Heater (HR8)
- Thermostat (S10)
- Connector (P21) and harness


COMPRESSOR (B1)
CONNECTOR (J11)
THERMOSTAT (S10)
HEATER (HR8)
HEATER (HR7)
CONNECTOR (P21) AND HARNESS
THERMOSTAT (S4)
POWER SOURCE 208 VOLT 3 PHASE 400 HERTZ

TS4120-370-14/5-20

Figure 5-20. Compressor (B1)

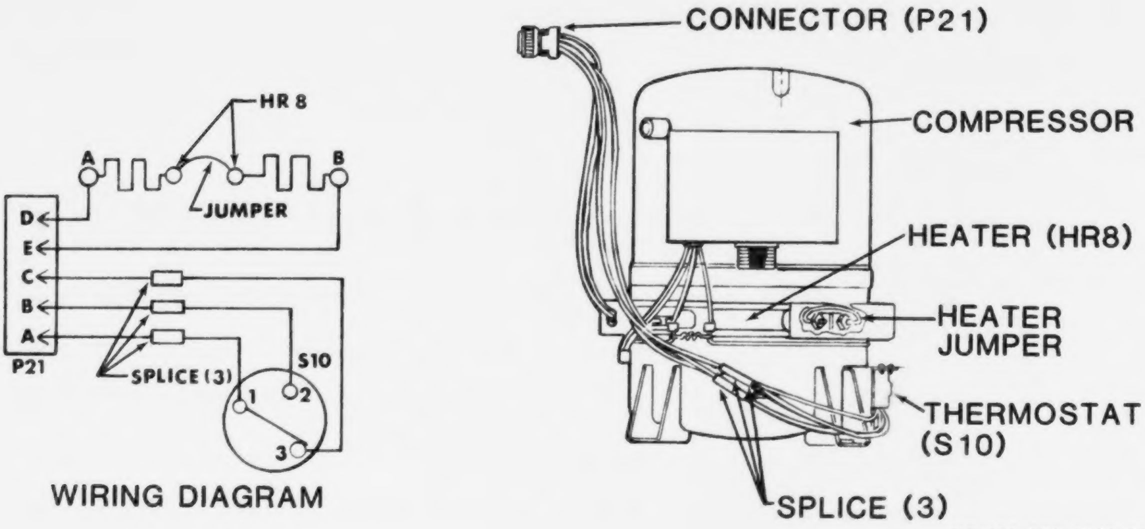
a. Inspection/Test

(1) Check to be sure power has been **disconnected** from the air conditioner. Shutting the unit off at the control panel does not disconnect power to compressor heaters.

(2) Allow heaters to cool before touching.

(3) Check quick warm up heater (HR8) and thermostat (S10) as follows:

(a) Using a multimeter, check continuity between contacts D and E on P21 connector. Continuity should be indicated. If continuity was indicated, skip steps (b) through (d).


HR 8
A
B
JUMPER
D
E
C
B
A
P21
SPLICE (3)
S10
1
2
3
WIRING DIAGRAM
CONNECTOR (P21)
COMPRESSOR
HEATER (HR8)
HEATER JUMPER
THERMOSTAT (S10)
SPLICE (3)

TS4120-370-14/5-21

Figure 5-21. Quick Warm Up Heater (HR8) and Thermostat (S10)

(b) Check that jumper between heater halves is secure. Check jumper for continuity. If continuity is not indicated, repair or replace jumper.

(c) Check continuity between P21 contact D and heater terminal A and contact E and terminal B. If continuity is not indicated, repair or replace wire leads.

(d) Check continuity between heater half terminals. If continuity is not indicated, replace heater.

(e) Check heater (HR8) for visible damage, missing terminals or terminal covers, and secure attachment of clamping hardware.

(f) Continuity check thermostat (S10) at connector P21 in accordance with following chart.

TEMPERATURE AT S10 THERMOSTAT	CONTINUITY SHOULD BE INDICATED		
	Contact A to B	Contact B to C	Contact A to C
Above 70 ± 8°F (21.1 ± 4.4°C)	YES	NO	NO
Below 50 ± 5°F (10 ± 2.8°C)	NO	NO	YES
Thermostat actuates at 70 ± 8°F (21.1 ± 4.4°C) and resets at 50 ± 5°F (10 ± 2.8°C)			

If the thermostat fails any of the above tests check that splices are properly installed. Repeat above test. Replace thermostat (S10) if bad.

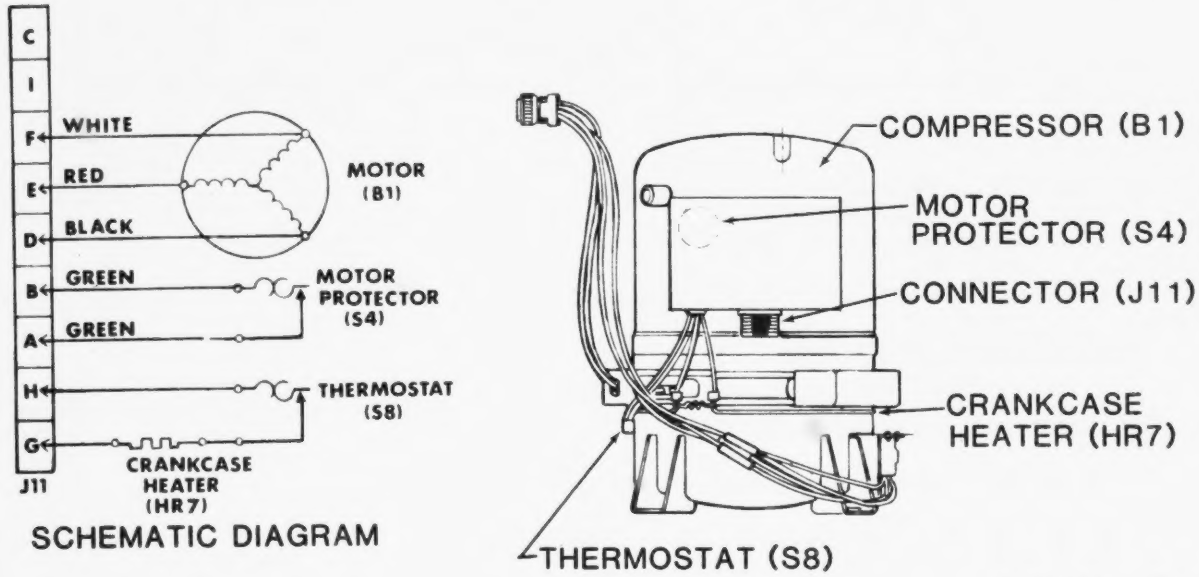
(4) Check compressor (B1), motor protector (S4), heater (HR7), and thermostat (S8) as follows:

(a) Disconnect P11 connector and harness from J11 connector located on compressor junction box.

(b) Remove wing nut from compressor junction box cover and pull junction box cover from compressor.

(c) Check that all wire connections are secure and in good condition.

(d) Using multimeter, check continuity between connector (J11) contacts D to E, D to F, and E to F. Continuity should be indicated. If continuity is not indicated, check that wires are properly connected. If wires are properly connected and continuity is still not indicated, replace compressor.



TS4120-370-14/5-22

Figure 5-22. Compressor (B1), Motor Protector (S4), Heater (HR7), and Thermostat (S8) Test

(e) Check continuity between J11 contacts A and B. If there is no continuity and wires are properly connected, the motor protector (internal thermostat) is open. Replace the compressor.

(f) Check continuity between J11 contacts A, B, D, E, and F and compressor canister. If wires are properly connected and there is continuity indicated, there is an internal short. Replace the compressor.

(g) Check continuity between J11 contacts G and H. If there is continuity between these pins, both the heater element and thermostat are all right. If there is no continuity between the pins, bare the splice between the heater lead and thermostat lead, and separately check for continuity between pin G and the splice, and pin H, and the splice. If there is continuity between pin G and the splice, but not between pin H and the splice, the heater element is all right and the thermostat is bad. If there is continuity between pin H and the splice, but not between pin G and the splice, the thermostat is all right and the heater element is bad. If there is no continuity between either pin and the splice, both the element and the thermostat are bad.

b. Connector (J11) replacement. (Refrigerant system discharge is not required.)

(1) Assuming that the power has been disconnected at the power source, and covers have been removed during access and testing.

(2) Remove the retaining hardware from the connector. Pull the connector out of the box to gain access to the solder connections.

(3) Tag and unsolder wires.

(4) Using tags and wiring diagram (fig. 4-20), solder wires to new connector. Remove the tags.

(5) Secure the connector to the compressor junction box with four screws, lock washers, and nuts.

c. Heater (HR7) replacement. (Refrigerant system discharge is not required.)

(1) Check to see that the power has been disconnected at the power source and covers have been removed during access and testing.

WARNING

Allow heater to cool before touching. Severe burns can result from touching hot heater.

(2) Tag and disconnect two heater leads.

(3) Using pliers, remove retaining spring on heater.

(4) Spread the heater ends to clear junction box.

(5) Lift heater up and off compressor crankcase.

(6) Install new heater as follows:

(a) Spring heater ends apart and place heater down and around compressor in position on crankcase. Secure heater on crankcase with retaining spring.

(b) Run leads through the grommet in the compressor junction box.

(c) See tags on the removed heater. Connect heater leads.

(d) If this completes the repair, install terminal box cover.

d. Thermostat (S8) replacement. (Refrigerant system discharge is not required.)

(1) Check to see that the power has been disconnected at the power source and covers have been removed during access and testing.

(2) Tag and disconnect two thermostat leads.

(3) Using pliers, bend retaining tabs back.

(4) Remove thermostat.

(5) Install new thermostat as follows:

(a) Insert thermostat and carefully bend retaining tabs back to secure thermostat.

(b) See tags on removed thermostat. Connect thermostat leads.

(c) If this completes the repair, install terminal box cover.

e. Heater (HR8) replacement. (Refrigerant system discharge is not required.)

(1) Check to see that the power has been disconnected at the power source and covers have been removed during access and testing.

WARNING

Allow heater to cool before touching. Severe burns can result from touching hot heater.

(2) Using screwdriver, remove two screws from each of the two heater terminal covers.

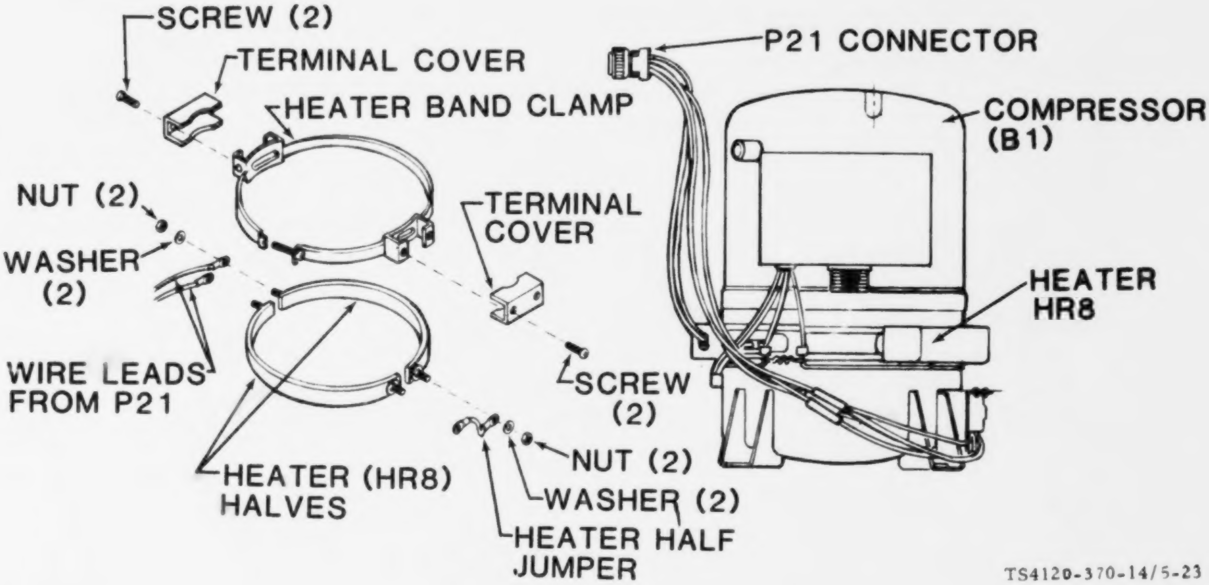

SCREW (2)
TERMINAL COVER
HEATER BAND CLAMP
P21 CONNECTOR
COMPRESSOR (B1)
NUT (2)
WASHER (2)
TERMINAL COVER
HEATER HR8
WIRE LEADS FROM P21
SCREW (2)
NUT (2)
HEATER (HR8) HALVES
WASHER (2)
HEATER HALF JUMPER
TS4120-370-14/5-23

Figure 5-23. Heater (HR8)

(3) Remove two terminal covers.

(4) Tag and disconnect wire leads and jumper.

(5) Using screwdriver, loosen screw in heater band clamp.

(6) Remove band clamp and two heater halves.

(7) Install new heater as follows:

(a) Position heater halves and heater band clamp on compressor.

(b) Using screwdriver, tighten screw in band clamp.

(c) See tags and wiring diagram (fig. 4-20) and connect wire leads and jumpers.

(d) Remove tags.

(e) Using screwdriver, secure the two terminal covers with four screws.

f. Thermostat (S10) replacement. (Refrigerant system discharge is not required.)

(1) Check to see that the power has been disconnected at the power source and covers have been removed during access and testing.

(2) Tag and disconnect leads at splices.

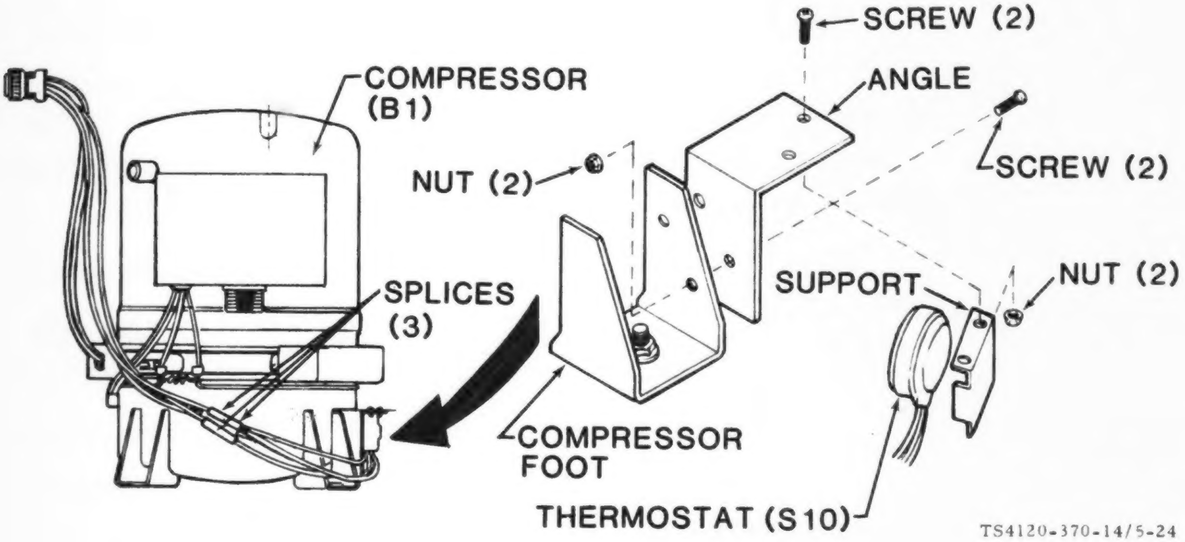


Figure 5-24. Thermostat (S10)

(3) Using screwdriver, remove two screws and nuts that secure support to angle.

(4) Remove support and thermostat (S10).

(5) Install new thermostat as follows:

(a) Using screwdriver, install support and thermostat with two screws and nuts. Be sure thermostat face is making good contact with side of compressor.

(b) See tags on old thermostat and wiring diagram (fig. 4-20). Install new splices and connect leads.

g. Compressor replacement

(1) Check to see that the power has been disconnected at the power source, connectors (P21 and P11) were disconnected and that covers have been removed during access and test.

(2) Using screwdriver, remove two screws and flat washers. Disconnect the (P2) connector from the condenser fan motor and pull the connector mounting bracket out of the way.

NOTE

The compressor is mounted to the cabinet base by four bolts that are inserted from the underside of the base. In order to remove the compressor, it is necessary that the entire air conditioner be raised and placed on blocks of sufficient height to allow for removal of these bolts from below the base.

(3) Attach an overhead hoist to the lifting fitting on each side of the cabinet, using a sling and spreader bar.

(4) Raise the cabinet and place it on blocks at least four inches high. Be sure the blocks do not obstruct the holes in the base through which the compressor mounting bolts must be removed.

(5) Unwrap the insulation from the suction line so that the joint on the compressor is exposed.

(6) Discharge the refrigerant system per paragraph 5-7.

(7) While purging the system with nitrogen, debraze the tubing. (See para 5-8 and 5-9.)

(8) Using two socket and ratchet wrenches, remove four nuts and washers from top of mounting foot and four shoulder bolts, flat washers, and rubber washers from underneath side of unit.

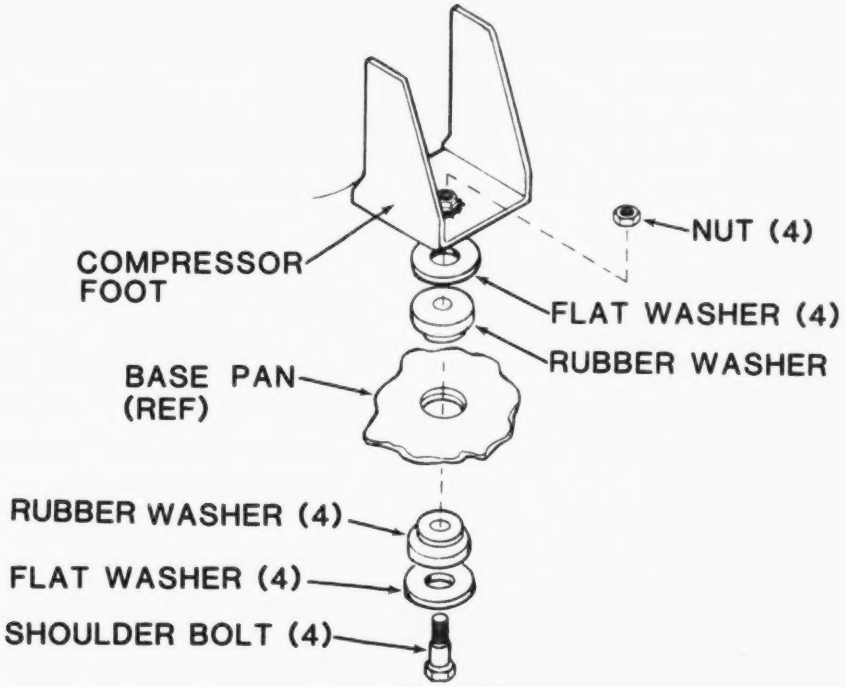


Figure 5-25. Compressor Mounting Hardware

(9) Lift or tilt the compressor and remove rubber washer from under each of the four mounting feet.

WARNING

If compressor burn out is suspected, use care when handling compressor to avoid touching compressor sludge. Acid in sludge can cause burns.

(10) Carefully slide compressor from air conditioner.

(11) Check the compressor to see if a motor burn out is indicated.

h. Compressor motor burn out

(1) After removal of a bad compressor from the refrigeration system, remove all external tubing and tip the compressor toward the discharge port to drain sample of oil into a clear glass container.

WARNING

Avoid skin contact or inhaling fumes from any acid formed by burn out of oil and refrigerant.

(2) If the oil is clean and clear, and does not have a burnt acid smell, the compressor did not fail because of motor burn out. If a burn out is not indicated, proceed to i.

(3) If the oil is black, contains sludge, and has a burnt acid odor, the compressor failed because of motor burn out.

(4) You must clean the entire refrigeration system after a burn out has occurred, since contaminants will have been carried to many corners and restrictions in the piping and fittings. These contaminants will soon mix with new refrigerant gas and compressor oil to cause repeated burn outs.

(5) Remove the filter-drier, and blow down each leg of the refrigeration system. To do this, connect a cylinder of dry nitrogen to each filter-drier connection in turn, and open the cylinder shutoff valve for at least 30 seconds at 50 psig (3.5 kg/cm^2) pressure.

(6) Connect the two filter-drier fittings with a jumper, locally manufactured from refrigerant tubing and fittings.

(7) Clean system by back-flushing with liquid R-11 (item 11, Appendix E) from pressurized cylinder or circulating pump and reservoir with pressure of at least 100 psig.

(8) If pump is used, connect the discharge line of the refrigerant system to the discharge side of pump.

(9) Connect a line containing a filter to the suction line in the unit.

NOTE

An unused filter-drier or other suitable medium may be used as a filter.

(10) The other end of the temporary suction line should be connected to a small drum or suitable reservoir.

(11) A line should be run from the bottom of the reservoir to the inlet of the pump.

WARNING

Avoid skin contact or inhaling fumes from any acid formed by burn out of oil and refrigerant. Wear a gas mask if area is not thoroughly ventilated. Wear protective goggles or glasses to protect eyes. Wear rubber gloves to protect hands.

(12) Fill reservoir with fluorocarbon refrigerant, R-11, and start the pump. Continue filling the reservoir with refrigerant, R-11, until it begins to pour out of the return line. Continue flushing for at least 15 minutes.

(13) Reverse the pump connections, replace the filter with a new filtering medium, and backflush the system for an additional 15 minutes.

(14) Remove the pump, reservoir, filter, and filter-drier jumper. Place an empty container below the compressor connections, and connect a cylinder of dry nitrogen to each filter-drier connection in turn. Blow down each leg of the system at 50 psig (3.5 kg/cm^2) for at least 30 seconds.

(15) Disconnect the dry nitrogen cylinder. Cap or plug open connections if compressor and filter-drier are not to be installed immediately.

i. Compressor installation

CAUTION

The compressor is supplied with a complete charge of oil. Take care that oil is not lost when handling and installing compressor.

NOTE

If any refrigeration piping was disconnected with the compressor being replaced, transfer the piping to the replacement compressor before installing it in the air conditioner. Check to see that replacement compressor is equipped with same type heaters as was on old compressor. If not, remove heaters and related parts from old compressor or replace with new ones. Locate parts and mount using old compressor as a guide. Installation of the thermostat mounting angle will require drilling of two holes. Match drill from angle.

(1) Lift compressor through the lower front panel opening and position it on base pen.

(2) Lift or tilt the compressor and install the rubber washer and flat washer between each of the four compressor mounting feet and the base pan.

(3) Install a flat washer and a rubber washer on each of the four mounting bolts, then install the bolts from beneath the base pan and install the nuts on the bolts.

(4) Wrap wet rags around compressor at connection points and while brazing direct flame away from compressor.

(5) While purging the system with nitrogen, braze the tubing joints. (See para 5-8 and 5-9.)

(6) Replace the dehydrator. (See para 5-14)

(7) Connect electrical connector plug (P11) to connector (J11) on compressor terminal box.

(8) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

(9) Reinstall and tape in place tubing insulation that was removed from suction line tubing. If it was damaged, replace with tubing insulation, item 17, Appendix E.

(10) Connect electrical connection plug (P2) to connector (J2) on condenser fan motor.

(11) Using screwdriver, secure connector mounting bracket to base pan with two screws and flat washers.

(12) Install junction box. (See para 4-44.)

(13) Install lower front panel. (See para 4-25.)

(14) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

5-20. LIQUID INDICATOR (SIGHT GLASS)

Preliminary procedures:
1. Remove lower front panel. (See para 4-25.)
2. Remove service valve cover. (See para 4-21.)

a. Inspection

(1) Check that glass window is clean and not cracked or broken. Clean if dirty. Replace liquid indicator if cracked or broken.

(2) Check for evidence of leakage. Leak test if leak is suspected. Repair or replace as indicated.

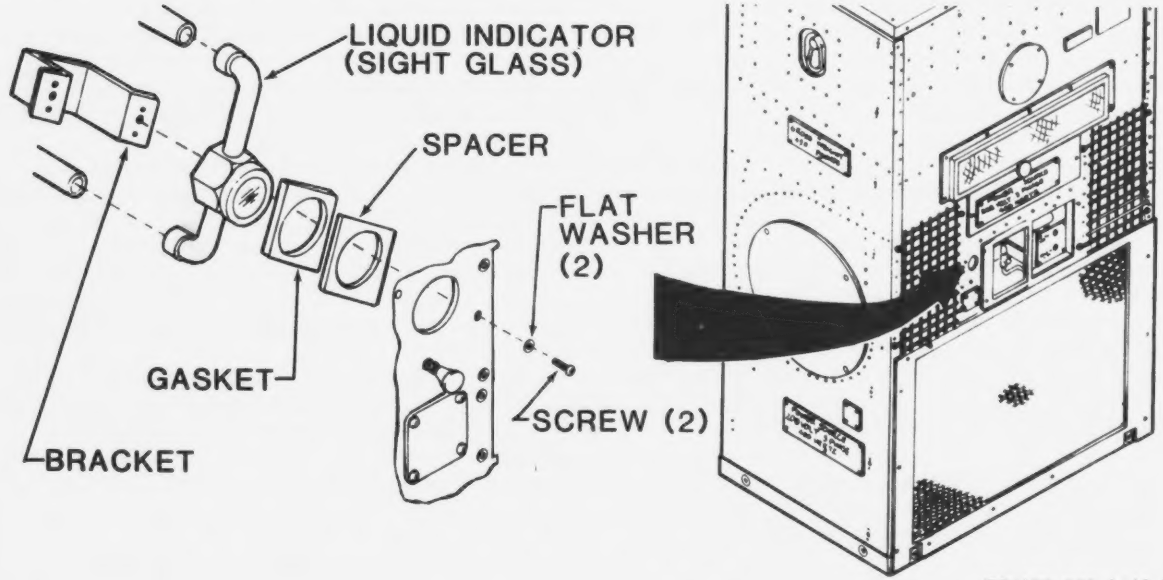

LIQUID INDICATOR (SIGHT GLASS)
SPACER
FLAT WASHER (2)
GASKET
SCREW (2)
BRACKET
TS4120-370-14/5-26

Figure 5-26. Liquid Indicator (Sight Glass)

b. Removal

(1) Using screwdriver, remove two screws and flat washers from rear while holding bracket so that it does not drop down into unit.

(2) Remove bracket.

(3) Carefully flex tubing back and remove gasket and spacer.

(4) Discharge the refrigerant system per paragraph 5-7.

(5) While purging the system with nitrogen, debraze the tubing. (See para 5-8 and 5-9.)

(6) Remove liquid indicator.

c. Installation

(1) Position liquid indicator in unit.

(2) While purging the system with nitrogen, braze the tubing joints. (See para 5-8 and 5-9.)

(3) Replace the dehydrator. (See para 5-14.)

(4) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

(5) Position bracket, spacer, and gasket and secure with two screws and flat washers.

(6) Install lower front panel. (See para 4-25.)

(7) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

5-21. EXPANSION VALVE

Preliminary procedure: Remove conditioned air filter. (See para 4-31.)

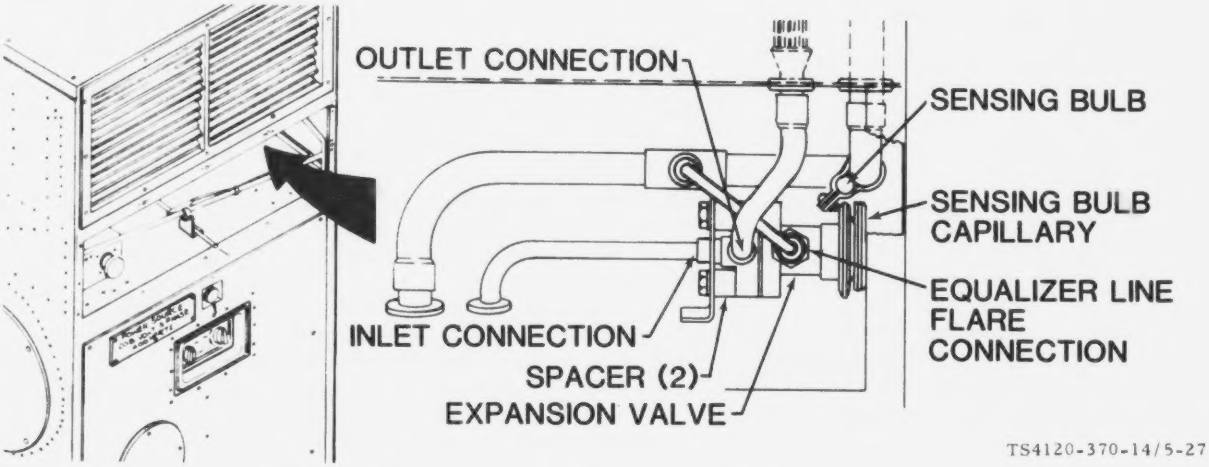

OUTLET CONNECTION
SENSING BULB
SENSING BULB CAPILLARY
EQUALIZER LINE FLARE CONNECTION
INLET CONNECTION
SPACER (2)
EXPANSION VALVE
TS4120-370-14/5-27

Figure 5-27. Expansion Valve

a. Inspection

(1) Inspect for evidence of leaks, kinked, or otherwise damaged capillary line, and loose or missing mounting hardware.

(2) Check thermal bulb to see that it is securely clamped to the suction line.

(3) If a leak is suspected or indicated, test per paragraph 5-10.

b. Testing and superheat adjustment. The expansion valve as supplied with the unit is preset at the factory. This valve should not be adjusted unnecessarily.

(1) Perform a refrigerant pressure check on unit in accordance with paragraph 5-13. Leave gages or service manifold attached.

(2) Remove the suction line insulation from the area of the sensing bulb. Observe location and position of bulb for reinstallation.

(3) Loosen the screws and nuts in the bulb straps that attach the sensing bulb to the suction line, and pull the bulb out of the straps.

CAUTION

Use care to not damage or kink the capillary.

WARNING

The following test must be conducted with the power on. Exercise extreme caution.

(4) Place the sensing bulb in a container of ice water or crushed ice so that it is reduced to a temperature near 32°F (0°C).

(5) Set the TEMPerature control thermostat knob fully DECREASE (counterclockwise), place one hand on the exposed suction return line, and start the air conditioner in COOL mode. If a drop in temperature is felt on the suction return line, the expansion valve is not closing fully and should be replaced. If the return line temperature remains constant, check the pressure gage; it should indicate approximately 58 ± 2 psi (4.0 ± 0.14 kg/cm^2). If the pressure is not within the above limits, test the operation of the quench valve (para 5-26) and the pressure regulator valve (para 5-23) before attempting adjustment of the evaporator expansion valve.

CAUTION

When performing the next test, turn the air conditioner to OFF as soon as a definite drop in temperature is felt on the suction return line. If the test conditions are continued more than a few seconds, the expansion valve will fully open and an excessive flood-back of liquid refrigerant may damage or destroy the compressor.

(6) With one hand still on the suction return line, remove the sensing bulb from the container and warm it in the other palm. If a temperature drop is not felt in the suction return line by the time the sensing bulb no longer feels cold to the hand, the expansion valve is not opening and should be replaced. As soon as a temperature drop is felt, turn the air conditioner to OFF.

NOTE

The optimum superheat setting for the evaporator expansion valve is 10°F (5.55°C) above the saturation temperature of the refrigerant at operating suction line pressure. This setting will provide maximum efficiency of the evaporator coil.

(7) Slip the sensing bulb into its mounting loop clamp. Be sure the bulb is installed in its original position and tighten the nut and screw. Be sure the sensing bulb is making metal-to-metal contact with the suction line.

(8) Attach an accurate thermometer to an exposed surface of the suction return line adjacent to the sensing bulb; use a small glob of thermal mastic, if available, to improve conductivity.

(9) Rewrap insulation on the suction return line, being sure to cover the sensing bulb.

(10) Start the air conditioner in the COOL mode with the thermostat set at fully DECREASE (counterclockwise) and allow it to run about 30 minutes, then check to be sure the temperature in the suction line has stabilized and the thermometer reading remains unchanged for at least 2 minutes.

(11) Note the pressure on the gage connected to the low pressure (suction) service valve. Find the saturation temperature for the pressure gage reading (See table 5-1.) and compare with the thermometer reading. The thermometer temperature should be 10 ± 1°F (5.55 ± 0.55°C) higher than the saturation temperature found on the chart.

(12) If the superheat setting is not within the limits shown above, adjust the expansion valve as follows:

(a) Remove the hexagonal seal cap from the side of the power assembly.

(b) Turn the adjusting stem two complete turns to change the superheat setting by 1°F (0.55°C). Turn the stem clockwise to increase superheat span; counterclockwise to decrease it. Do not change more than two full turns at one time, then wait at least 2 minutes for temperature to stabilize and recheck pressure and temperature before further adjustment.

(13) When the proper setting is obtained:

(a) Turn unit OFF.

(b) Replace hexagonal seal cap.

(c) Remove thermometer.

(d) Cover the bulb and suction line with two layers of insulation tape, item 12, Appendix E. Apply in spiral with overlapping edges.

(e) Close service valves on unit.

(f) Remove gages or service manifold from service valves.

(g) Install valve stem and hose connection protective caps.

(h) Using screwdriver, secure service valve cover with six screws, lock washers, and flat washers.

c. Removal

(1) Discharge the refrigerant system per paragraph 5-7.

(2) Unwrap insulation from suction line so that sensing bulb is exposed. Loosen screw and nut in clamp. Pull bulb out of clamp.

(3) Disconnect flare nut on external equalizer line from expansion valve.

(4) Remove the two screws, flat washers, lock washers, and spacers that attach the valve body to its mounting bracket.

(5) Remove remaining valve components except for body flange. (See figure 5-28.)

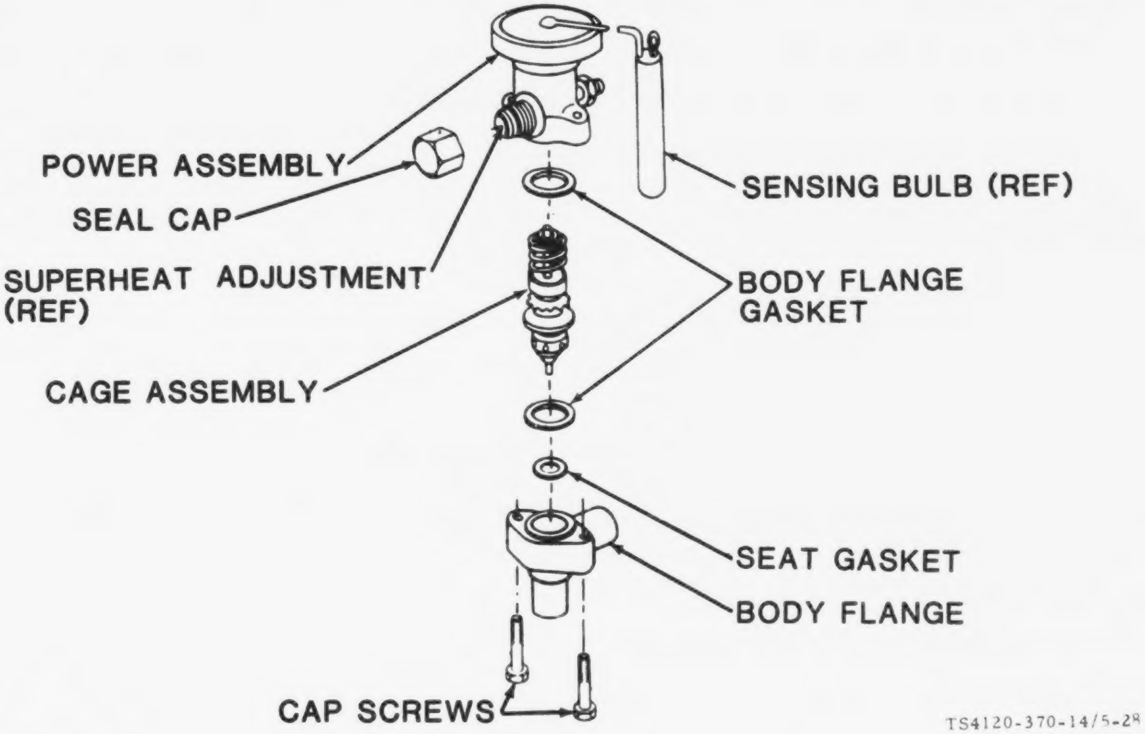

POWER ASSEMBLY
SEAL CAP
SUPERHEAT ADJUSTMENT (REF)
CAGE ASSEMBLY
SENSING BULB (REF)
BODY FLANGE GASKET
SEAT GASKET
BODY FLANGE
CAP SCREWS
TS4120-370-14/5-28

Figure 5-28. Expansion Valve Disassembly

NOTE

If valve body flange is not damaged, do not remove (debraze) it from the system.

(6) If valve body flange is to be removed, purge the system with nitrogen and debraze the two tubes. (See para 5-8 and 5-9.)

d. Installation

(1) If valve body flange was removed, purge the system with nitrogen and braze the two tubing joints. (See para 5-8 and 5-9.)

(2) See figure 5-28 for valve component arrangement.

(3) Place cap screws, lock washers, flat washers, and spacers through bracket and valve body flange.

(4) Be sure that valve components are properly assembled and alined and secure power assembly to body flange.

(5) Connect flare nut on external equalizer line to expansion valve.

(6) Insert the sensing bulb into its mounting loop clamp in its original position and tighten the screw and nut. Be sure the sensing bulb is making good metal-to-metal contact with the suction line.

(7) Reinstall and tape in place tubing insulation that was removed from suction line tubing. If it was damaged, replace with tubing insulation, item 17, Appendix E.

(8) Replace the dehydrator. (See para 5-14.)

(9) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

(10) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

Follow-on procedure: Install conditioned air filter. (See para 4-31.)

5-22. EVAPORATOR COIL

For inspection and cleaning of installed coil, see para 4-67.

Preliminary procedures:

1. Remove heater elements (HR1 through HR6). (See para 4-61.)
2. Remove conditioned air filter. (See para 4-31.)

a. Removal

(1) Discharge the refrigeration system per paragraph 5-7.

(2) Using a drill bit slightly smaller than the rivit body, drill out the two rivets that secure the heater thermostat bracket.

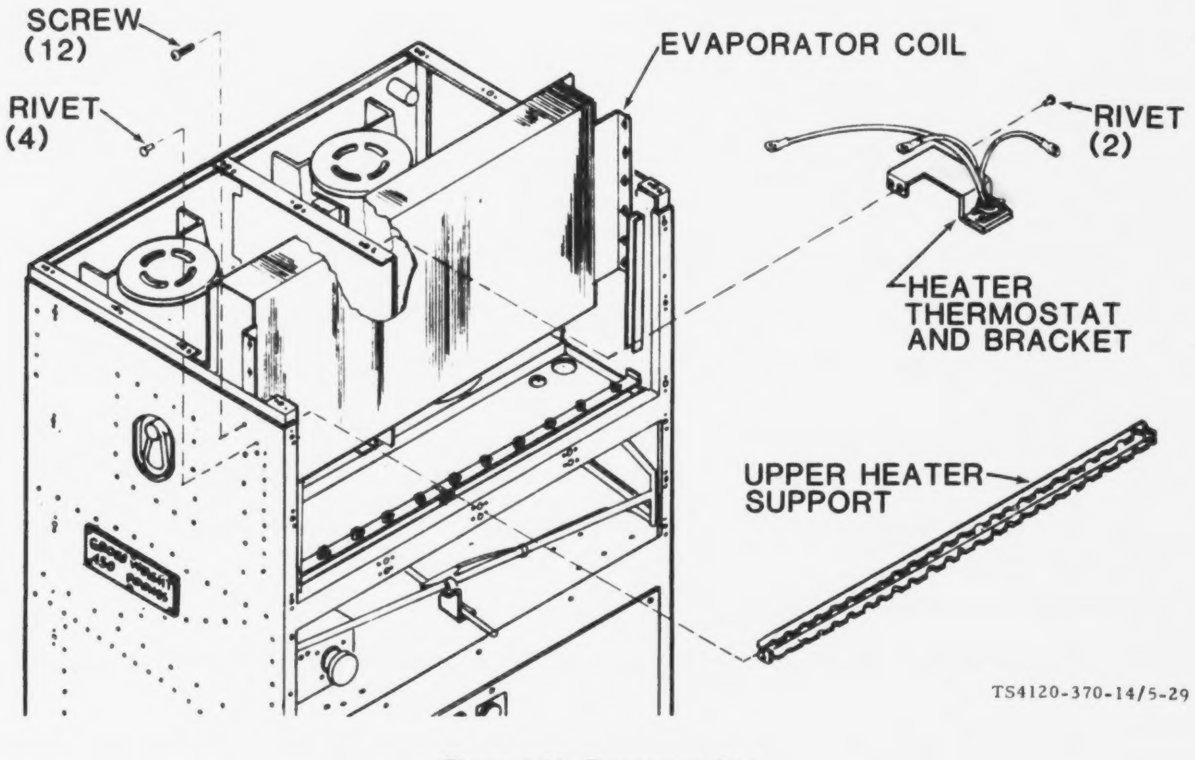

SCREW (12)
RIVET (4)
EVAPORATOR COIL
RIVET (2)
HEATER THERMOSTAT AND BRACKET
UPPER HEATER SUPPORT
TS4120-370-14/5-29

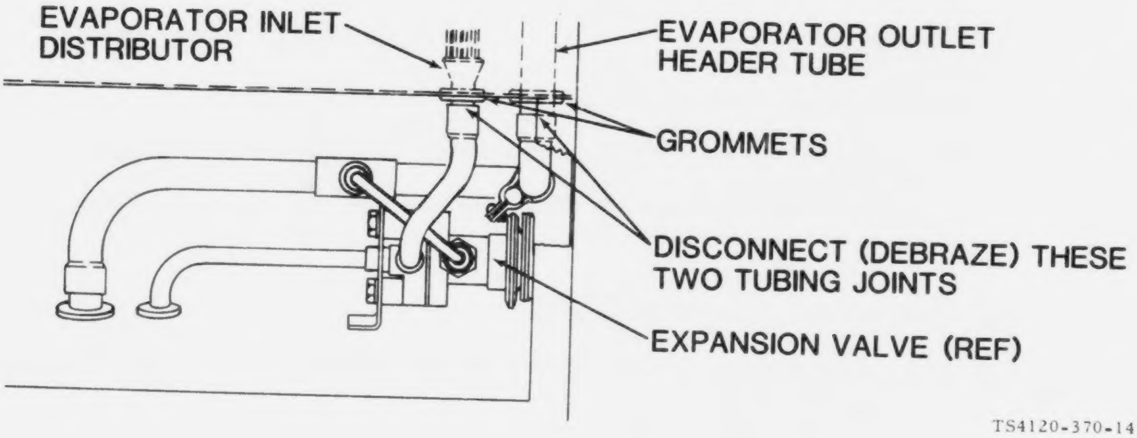
Figure 5-29. Evaporator Coil

(3) Remove the heater thermostat and bracket. (Wire leads should have been tagged and disconnected when heaters were removed.)

(4) Using a drill bit slightly smaller than the rivet body, drill out the four rivets that secure the upper heater support.

(5) Remove the upper heater support.

(6) Remove the two grommets from the inlet (distributor) and outlet evaporator tubes.


EVAPORATOR INLET DISTRIBUTOR
EVAPORATOR OUTLET HEADER TUBE
GROMMETS
DISCONNECT (DEBRAZE) THESE TWO TUBING JOINTS
EXPANSION VALVE (REF)

TS4120-370-14/5-30

Figure 5-30. Evaporator Tubing Connection Location

(7) While purging the system with nitrogen, debraze the tube joints to the evaporator. (See para 5-8 and 5-9.)

WARNING

When handling coils, wear gloves to avoid cuts and reduce fin damage on the coil.

(8) Using screwdriver, remove twelve screws while supporting the evaporator coil.

(9) Using gloves to protect your hands and coil fins, carefully lift the coil up and out of the unit.

b. Repair

(1) Repairs are limited to replacement of distributor, rivets, plate nuts, and straightening of mashed fins.

(2) Plate nuts may be removed by drilling out old rivets using a drill bit slightly smaller than the diameter of the rivet.

(3) Install new plate nut(s) and rivets.

(4) If fins are mashed or dented so that air flow across coil would be blocked, straighten them using a plastic fin comb.

(5) To replace distributor, debraze distributor from distributor lines. Braze new distributor to the lines. Check to be sure that all lines are clean and not blocked internally with solder or flux.

c. Installation

WARNING

When handling coils, wear gloves to avoid cuts and reduce fin damage on the coil.

(1) Carefully slide evaporator coil down into unit and aline mounting holes.

(2) Using screwdriver, secure evaporator coil with twelve screws.

(3) While purging the system with nitrogen braze the tube joints. (See para 5-8 and 5-9.)

(4) Replace the dehydrator. (See para 5-14.)

(5) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

(6) Install grommets on inlet and outlet tubes.

(7) Reinstall and tape in place tubing insulation that was removed from suction line tubing. If it was damaged, replace with tubing insulation, item 17, Appendix E.

(8) Secure upper heater support with four rivets.

(9) Secure heater thermostat and bracket with two rivets.

(10) Install heaters (HR1 through HR6). Check that all wire leads are connected and tags removed prior to installation of top panel. (See para 4-61.)

(11) Evacuate and charge the refrigeration system. (See para 5-11 and 5-12.)

Follow-on procedure: Install conditioned air filter. (See para 4-31.)

5-23. PRESSURE REGULATOR VALVE

a. Adjustment/Test

(1) Valves are factory set to start opening when suction pressure decreases to 58 psig. Do not adjust unless you are sure adjustment is necessary.

(2) Perform a refrigeration pressure check on unit in accordance with paragraph 5-13. Leave the gages or service manifold attached.

(3) Set TEMPerature control thermostat knob fully INCREASE (clockwise), start air conditioner in COOL mode, and observe pressure gages. Suction pressure should drop to 58 ± 2 psi (4.0 ± 0.14 kg/cm^2) shortly after compressor starts, and then remain constant.

(4) To adjust suction pressure, remove button plug from top of pressure regulator valve and turn adjusting stem clockwise to raise (increase) pressure, or counterclockwise to lower (decrease) pressure. If pressure is low (below 56 psi) and cannot be raised by adjustment, pressure regulator valve must be replaced. If pressure is high (above 60 psi) and cannot be lowered by adjustment, test operation of the quench valve (para 5-26) before replacing pressure regulator valve.

b. Removal

(1) Discharge the refrigerant system per paragraph 5-7.

(2) Remove the lower front panel. (See para 4-25.)

(3) Using screwdriver and wrench, remove screw, flat washer, nut, spacer, and clamp from pressure regulator valve.

(4) Carefully cut tiedown strap that holds quench valve capillary tubing coil to pressure regulator valve. Pull capillary coil away from pressure regulator valve.

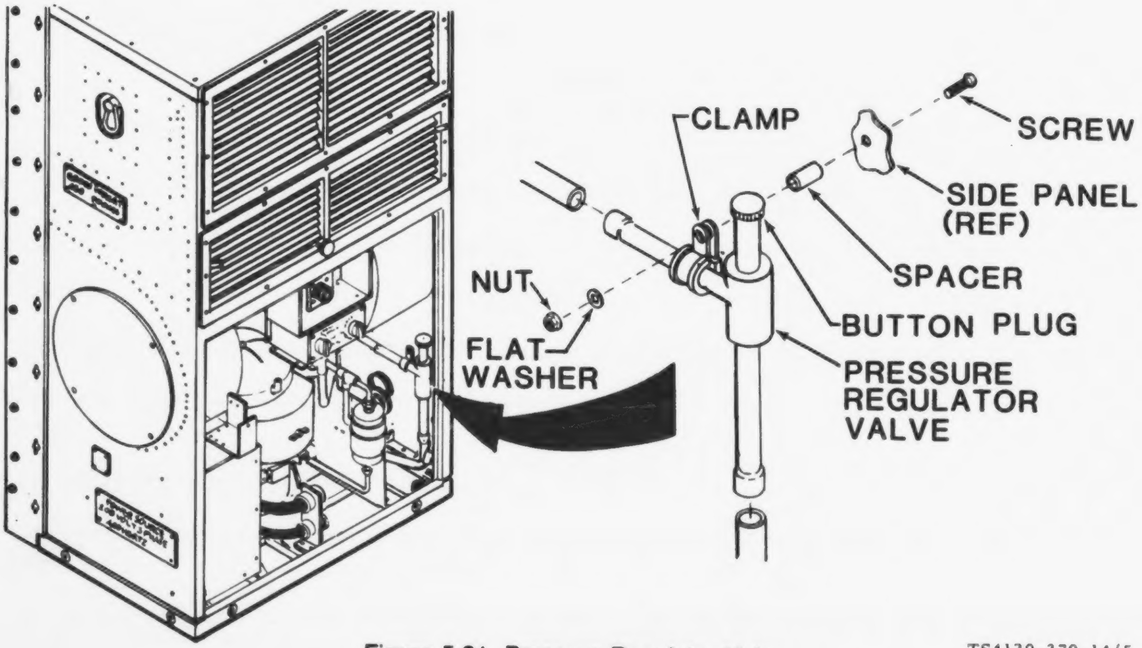


Figure 5-31. Pressure Regulator Valve

TS4120-370-14/5-31

(5) Discharge the refrigeration system in accordance with paragraph 5-7.

(6) Purge the system with nitrogen and debraze the tube connections. (See para 5-8 and 5-9.)

(7) Remove the pressure regulator valve.

c. Installation

(1) Place the pressure regulator valve on the tube ends, purge the system with nitrogen and braze the tube joints. (See para 5-8 and 5-9.)

(2) Using a screwdriver and wrench, secure the pressure regulator valve to the side panel with a screw, flat washer, spacer, clamp, and nut.

(3) Clamp quench valve capillary tubing coil in place on pressure regulator valve with a tiedown strap.

(4) Replace the dehydrator. (See para 5-14.)

(5) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

(6) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

Follow-on procedure: Install lower front panel. (See para 4-25.)

5-24. SOLENOID VALVES (K3 and K4) TEST AND COIL REPLACEMENT

Preliminary procedure: Remove lower front panel. (See para 4-25.)

a. Test

(1) Check to be sure power has been disconnected.

NOTE

The following basic instructions apply to both the equalizing solenoid valve (K4) and the liquid line solenoid valve (K3).

(2) Disconnect wiring harness connector (P6) from connector (J6) on solenoid valve (K3) or connector (P5) from connector (J5) on solenoid valve (K4).

(3) Use a multimeter set on lowest OHMS scale to check for continuity between contacts A and B in solenoid valve connector. If continuity is not found, coil is open and must be replaced.

(4) Use multimeter to check for continuity between each contact in solenoid valve connector and coil casing. If continuity is found between either contact and case, the coil is grounded and should be replaced.

(5) If continuity checks are satisfactory, apply 24 volts dc from an external power supply across contacts A and B in solenoid valve connector, and listen for a sharp click when the valve changes position. If a click is not heard, internal valve problems are indicated and entire valve should be replaced. (Go to para 5-25.)

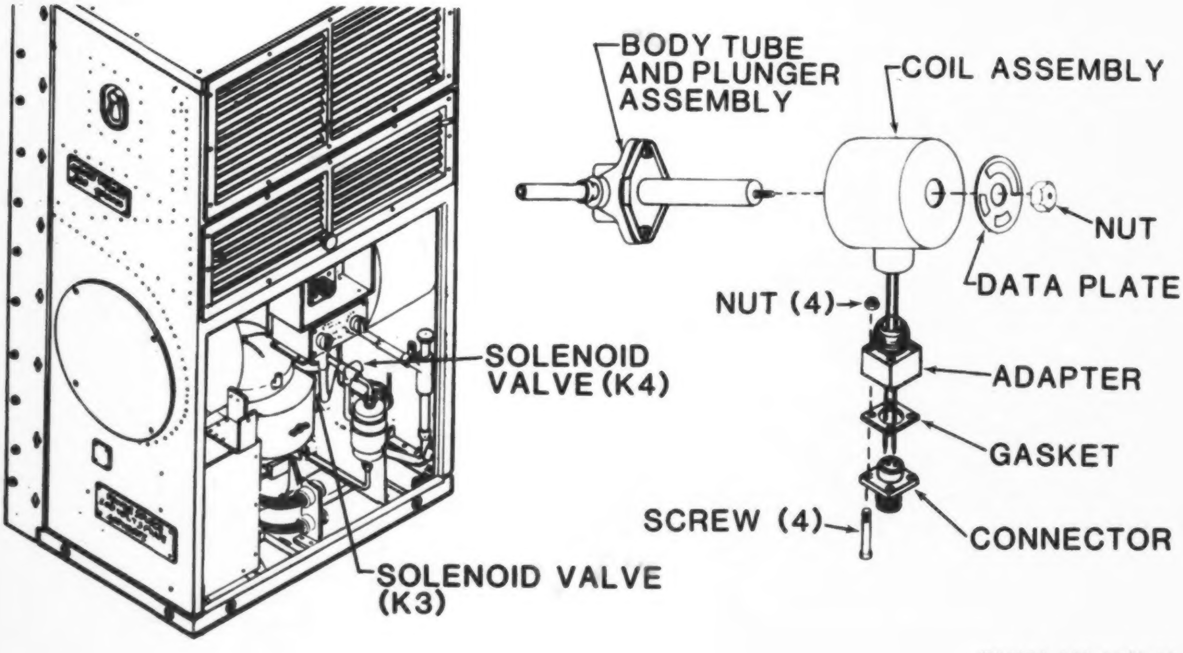

BODY TUBE AND PLUNGER ASSEMBLY
COIL ASSEMBLY
NUT
DATA PLATE
NUT (4)
SOLENOID VALVE (K4)
ADAPTER
GASKET
SCREW (4)
CONNECTOR
SOLENOID VALVE (K3)
TS4120-370-14/5-32

Figure 5-32. Solenoid Valve Coil Replacement

b. Coil replacement. The coil can be replaced without opening the refrigeration pressure system.

WARNING

Do not attempt any disassembly of solenoid valve other than coil removal with a refrigerant charge in the system. Refrigerant will be sprayed out dangerously if screws that attach tube and plunger assembly to valve body are loosened.

(1) Remove nut that attaches coil to valve body, and remove coil and connector assembly.

(2) Remove four screws and nuts that attach connector to adapter on coil.

(3) Pull connector away from adapter, unsolder coil leads from pins in the connector, and remove connector and gasket.

(4) Remove adapter from the coil casing.

(5) Feed leads of new coil through adapter, and install adapter on coil casing.

(6) Feed coil leads through gasket and solder them to pins in connector. Then install gasket, connector, and four attaching screws and nuts on adapter.

(7) Install coil and connector assembly, and the attaching nut on valve body.

(8) Connect harness connector to connector on solenoid valve.

Follow-on procedure: Install lower front panel. (See para 4-25.)

5-25. SOLENOID VALVES (K3 AND K4)

For testing and replacement of coils, see paragraph 5-24.

Preliminary procedure: Remove lower front panel. (See para 4-25.)

a. Removal

(1) Check to be sure power has been disconnected.

(2) Discharge the refrigeration system in accordance with paragraph 5-7.

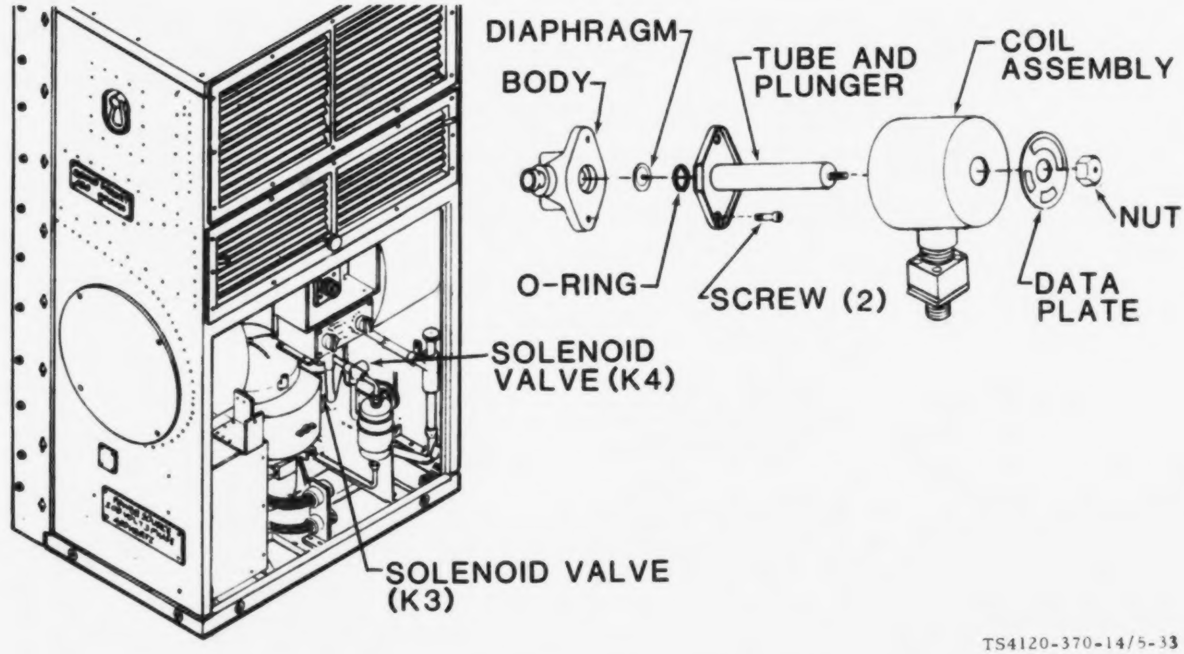

DIAPHRAGM
BODY
TUBE AND PLUNGER
COIL ASSEMBLY
NUT
O-RING
SCREW (2)
DATA PLATE
SOLENOID VALVE (K4)
SOLENOID VALVE (K3)

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Figure 5-33. Solenoid Valves (K3 and K4)

(3) Disconnect wiring harness connector (P6) from (J6) on solenoid valve (K3) or connector (P5) from connector (J5) on solenoid valve (K4).

(4) Remove nut that attaches coil to valve body.

(5) Remove coil assembly and data plate.

(6) Remove two screws that attach tube and plunger assembly to valve body. Remove tube and plunger assembly, and all other removable internal components from valve body.

(7) Check valve body for visible damage. Normally valve body replacement is unnecessary. If valve body is in good condition, skip steps (8) through (10).

(8) Using screwdriver, remove two screws and lock washers from base of valve body.

(9) Purge the system with nitrogen and debraze the tube connections. (See para 5-8 and 5-9.)

(10) Remove the valve body.

b. Installation. If valve body was not removed, go to step (3).

(1) Place the valve body on the tube ends, purge the system with nitrogen and braze the tube joints. (See para 5-8 and 5-9.)

(2) Using a screwdriver, secure the valve body to the bracket with two screws and lock washers.

(3) Check internal surfaces of valve body to be sure it is clean.

(4) Carefully install diaphragm, O-ring, and tube and plunger. Secure to valve body with two screws.

(5) Place coil assembly and data plate onto tube and plunger and secure with nut.

(6) Reconnect connector and harness.

(7) Replace the dehydrator. (See para 5-14.)

(8) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

(9) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

Follow-on procedure: Install lower front panel. (See para 4-25.)

5-26. LIQUID QUENCH EXPANSION VALVE

Preliminary procedure: Remove the lower front panel. (See para 4-25.)

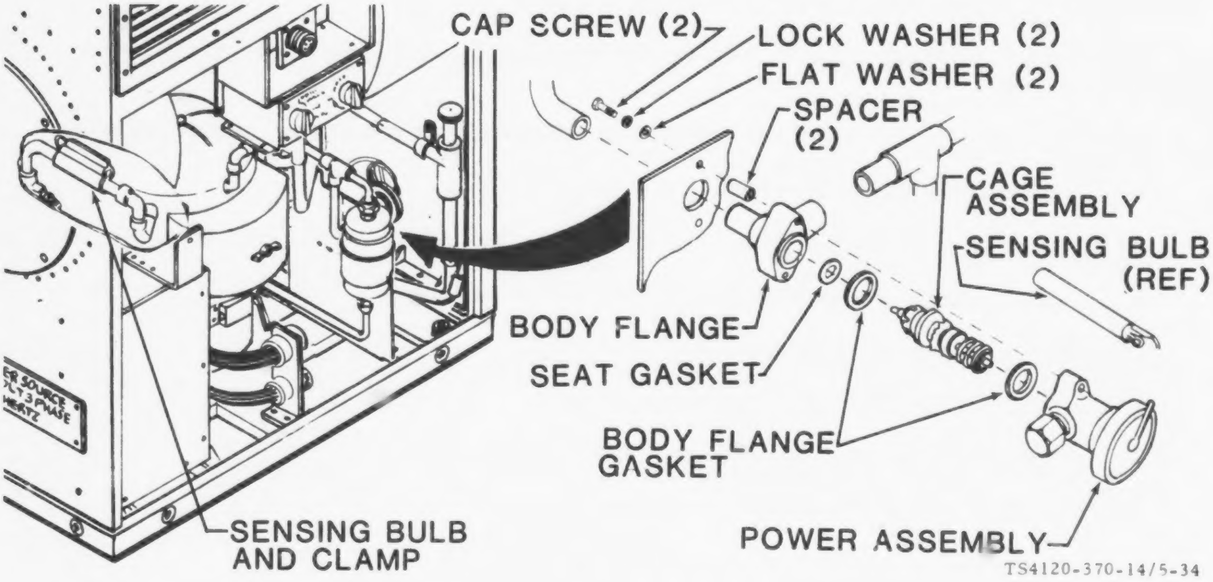

CAP SCREW (2)
LOCK WASHER (2)
FLAT WASHER (2)
SPACER (2)
CAGE ASSEMBLY
SENSING BULB (REF)
BODY FLANGE
SEAT GASKET
BODY FLANGE GASKET
POWER ASSEMBLY
SENSING BULB AND CLAMP
TS4120-370-14/5-34

Figure 5-34. Liquid Quench Expansion Valve

a. Inspection

(1) Inspect for evidence of leaks, kinked, or otherwise damaged capillary line, and loose or missing mounting hardware.

(2) Check thermal bulb to see that it is securely clamped to the suction line.

(3) If a leak is suspected or indicated, test per paragraph 5-10.

b. Test

(1) Perform a refrigerant pressure check on unit in accordance with paragraph 5-13. Leave gages or service manifold attached.

(2) Unwrap insulation from compressor suction line so that sensing bulb and an adjacent section of the line is exposed.

(3) Attach an accurate thermometer to an exposed surface of suction line adjacent to the sensing bulb; use a small gob of thermal mastic, if available, to improve conductivity.

(4) Check that service valve and gage connection to low (suction) sides are open. Note pressure indicated on gage and temperature indicated on thermometer.

(5) Set the TEMPerature control thermostat knob to full INCREASE (clockwise). Start the air conditioner in COOL mode. Note that suction pressure drops to 58 ± 2 psig (4.0 ± 0.2 kg/cm²). Allow compressor to run for at least 20 minutes. If pressure is not within above limits, test operation of pressure regulating valve (para 5-23) before proceeding with quench valve test.

NOTE

Except in a very hot climate, with room air temperature above 90°F (32.2°C), the refrigeration system will be in a bypass cycle with a maximum volume of hot discharge vapor being recirculated back to suction side of compressor through pressure regulator valve and quench valve.

(6) Observe that temperature indicated remains stable for a minimum of two minutes, then find saturation temperature for pressure indicted on gage, using table 5-1. For example: The saturation temperature for a refrigerant pressure of 69 psig (4.85 kg/cm²) is 40°F (4.4°C).

(7) Compare the saturation temperature with indicated temperature. The indicated temperature should be 25 ± 5°F (13.9 ± 2.2°C) higher than the saturation temperature. If indicated temperature is not within above limits, quench valve is not functioning properly and should be replaced.

(8) Turn unit OFF.

(9) Remove thermometer.

(10) Reinstall and tape in place tubing insulation that was removed from suction line tubing. If it was damaged, replace with tubing insulation, item 17, Appendix E.

(11) Close service valves on unit.

(12) Remove gages or service manifold from service valves.

(13) Install valve stem and hose connection protective caps.

(14) Using screwdriver, secure service valve cover with six screws, lock washers, and flat washers.

c. Removal

(1) Discharge the refrigerant system per paragraph 5-7.

(2) Unwrap insulation from suction line so that sensing bulb is exposed. Loosen screw and nut in clamp. Pull bulb out of clamp.

(3) Using wrench, remove two cap screws, lock washers, flat washers, and spacers that attach valve body to bracket and power assembly.

(4) Carefully remove the power assembly, cage assembly, and gaskets.

NOTE

If valve body flange is not damaged, do not remove (debraze) it from the system.

(5) If valve body flange is to be removed, purge the system with nitrogen and debraze the two tubes. (See para 5-8 and 5-9.)

d. Installation

(1) If valve body flange was removed, purge the system with nitrogen and braze the two tubing joints. (See para 5-8 and 5-9.)

(2) See figure 5-34 for valve component arrangement.

(3) Place cap screws, lock washers, flat washers, and spacers through bracket and valve body flange.

(4) Be sure that valve components are properly assembled and alined. Secure power assembly to body flange.

(5) Insert sensing bulb into its mounting loop clamp in its original position, and tighten the screw and nut. Be sure sensing bulb is making good metal-to-metal contact with suction line.

(6) Reinstall and tape in place tubing insulation that was removed from suction line tubing. If it was damaged, replace with tubing insulation, item 17, Appendix E.

(7) Replace the dehydrator. (See para 5-14.)

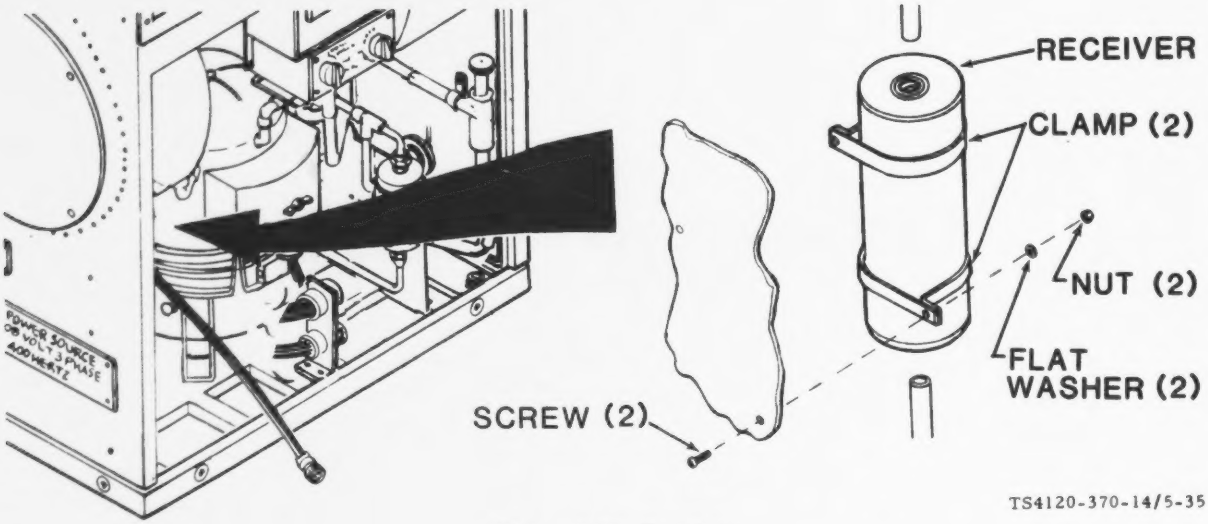
(8) Leak test all newly connected joints and those in the repaired area. (See para 5-10.)

(9) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

Follow-on procedure: Install lower front panel. (See para 4-25.)

5-27. RECEIVER

Preliminary procedure: Remove junction box. (See para 4-44.)



TS4120-370-14/5-35

Figure 5-35. Receiver

a. Inspection

(1) Check for general condition and signs of leakage. If leakage is suspected, leak test per paragraph 5-10.

(2) Check that mounting hardware is secure.

b. Removal

(1) Discharge the refrigeration system in accordance with paragraph 5-7.

(2) Using screwdriver, remove two screws, flat washers, nuts, and clamps from receiver.

(3) Purge the system with nitrogen and debraze the tube connections. (See para 5-8 and 5-9.)

(4) Remove the receiver.

c. Installation

(1) Place the receiver on the tube ends, purge the system with nitrogen, and braze the tube joints. (See para 5-8 and 5-9.)

(2) Using a screwdriver and wrench, secure the receiver to the side panel with two screws, flat washers, nuts, and clamps.

(3) Replace the dehydrator. (See para 5-14.)

(4) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

(5) Install the junction box. (See para 4-44.)

(6) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

5-28. PRESSURE RELIEF VALVE

Preliminary procedure: Remove lower front panel. (See para 4-25.)

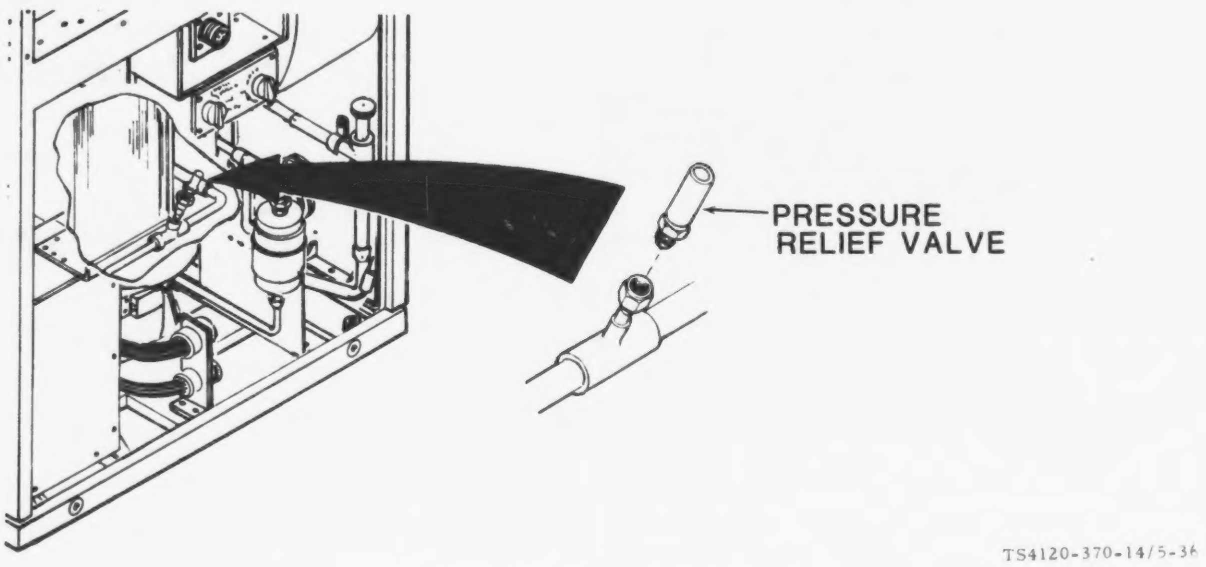


Figure 5-36. Pressure Relief Valve

a. Inspection

(1) Check for evidence of leakage. Leak test per paragraph 5-10, if leak is suspected.

(2) Check for damage. Replace if damaged.

b. Removal

(1) Discharge the refrigerant system per paragraph 5-7.

(2) Using two wrenches, hold fitting so that it is not twisted and unscrew pressure relief valve.

c. Installation

(1) Apply antisieze tape (item 13, Appendix E) to threads of valve.

(2) Using two wrenches, screw pressure relief valve in place while holding adapter fitting.

(3) Replace the dehydrator. (See para 5-14.)

(4) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

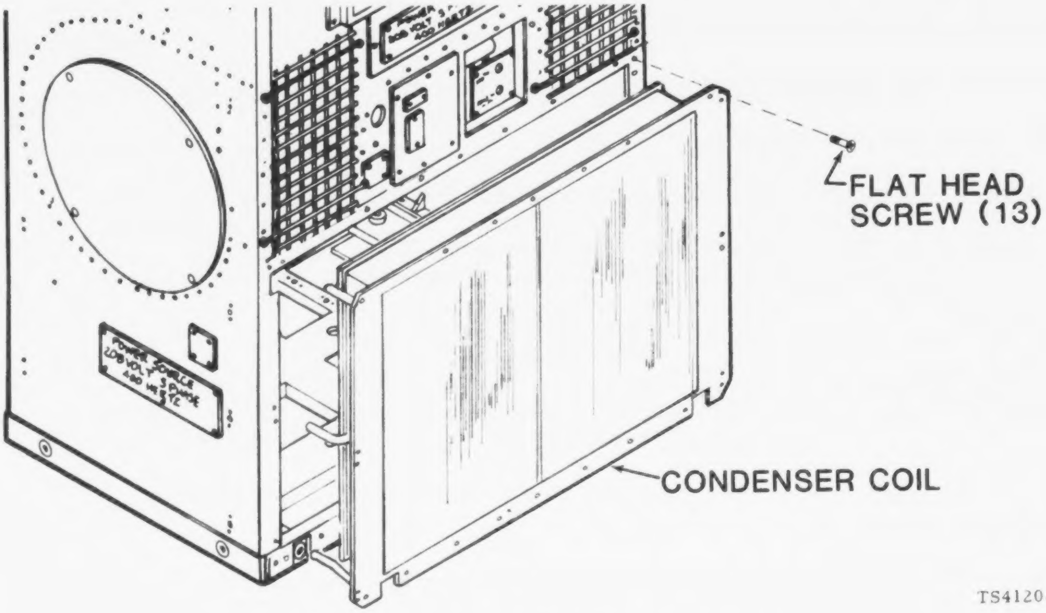
(5) Install lower front panel. (See para 4-25.)

(6) Evacuate and charge the refrigerant system. (See para 5-11 and 5-12.)

5-29. CONDENSER COIL

For inspection and cleaning of installed coil, see paragraph 4-68.

Preliminary procedures:
1. Remove junction box. (See para 4-44.)
2. Remove condenser coil guard. (See para 4-27.)



TS4120-370-14/5-37

Figure 5-37. Condenser Coil

a. Removal

(1) Discharge the refrigeration system per paragraph 5-7.

(2) While purging the system with nitrogen, debraze the tube joints to the condenser. (See para 5-8 and 5-9.)

WARNING

When handling coils, wear gloves to avoid cuts and reduce fin damage on the coil.

(3) Using screwdriver, remove thirteen screws while supporting the condenser coil.

(4) Using gloves to protect your hands and coil fins, carefully slide the coil out of unit.

b. Repair

(1) Repairs are limited to straightening of mashed fins.

(2) If fins are mashed or dented so that air flow across coil would be blocked, straighten them using a plastic fin comb.

c. Installation

WARNING

When handling coils, wear gloves to avoid cuts and reduce damage on the coil.

(1) Carefully slide condenser coil into unit and aline mounting holes.

(2) Using screwdriver, secure condenser coil with thirteen screws.

(3) While purging the system with nitrogen braze the tube joints. (See para 5-8 and 5-9.)

(4) Replace the dehydrator. (See para 5-14.)

(5) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

(6) Install junction box. (See para 4-44.)

(7) Evacuate and charge the refrigeration system. (See para 5-11 and 5-12.)

Follow-on procedure: Install condenser coil guard. (See para 4-27.)

5-30. TUBING AND FITTINGS

The refrigeration system contains a number of pieces of copper tubing in a variety of material grades, sizes, lengths, and shapes, and a number of elbows, tees, and adapters in several sizes. Observe the following when replacing any piece of tubing or fitting in the system:

Preliminary procedure: Remove covers and panels as necessary to have access to repair area.

a. Removal

(1) Discharge the refrigeration system in accordance with paragraph 5-7.

(2) Purge the system with nitrogen and debraze the tube connections. (See para 5-8 and 5-9.)

(3) Remove the part.

b. Installation

(1) Place the replacement part on the tube ends, purge the system with nitrogen and braze the tube joints. (See para 5-8 and 5-9.)

(2) Replace the dehydrator. (See para 5-14.)

(3) Leak test all newly connected joints and those in the repair area. (See para 5-10.)

(4) Install all covers and panels that were removed.

(5) Evacuate and charge the refrigerant system. (See para 5 11 and 5-12.)

5-31. INSULATION, CASING

a. Inspection

(1) Check for broken welds, badly bent or dented parts, and cracked or broken parts.

(2) Check that plate nuts and blind nuts are in place and secure.

(3) Refer repairs to general support maintenance.

(4) Check that insulation is not loose, missing, burnt, or otherwise damaged. Replace if missing or damaged. Reglue if loose.

b. Insulation/Removal

NOTE

Prior to removal of old insulation, cut the new replacement material to size using the old item as a sample.

(1) Remove as much old insulation material as possible, by pulling or scraping it away from the metal surface.

WARNING

Acetone and methyl-ethyl ketone (MEK) are flammable, and their vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use a well-ventilated area, wear gloves, and keep away from sparks or flame.

(2) Soften and remove old adhesive and insulation residue, using acetone or methyl-ethyl ketone (MEK) and a stiff brush.

c. Installation

(1) Cut to size.

(2) Be sure that the surface to which the insulation is to be applied is clean and free of paint and old adhesive material.

(3) If insulation to be installed does not have adhesive back, coat the mating surfaces of the metal and the insulation with adhesive (item 2, Appendix E). Let both surfaces air dry until the adhesive is tacky, but will not stick to the fingers.

(4) Starting with an end, carefully attach the insulation to the metal. Press into firm contact all over.

CHAPTER 6

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

6-1. GENERAL

Repair parts are listed and illustrated in TM 5-4120-370-24P. No special tools are required for general support maintenance of the air conditioner. Test, Maintenance, and Diagnostic Equipment (TMDE), and support equipment, includes standard electrical test equipment, and standard pressure and vacuum gages, vacuum pumps, and servicing manifolds found in any general support maintenance refrigeration facility.

Section II AUTHORIZED GENERAL SUPPORT MAINTENANCE ACTIONS

6-2. GENERAL

The only items restricted to general support maintenance level by the Maintenance Allocation Chart (MAC) are the repair of cracked or broken welds, repair or replacement of damper parts, blind nuts, nut plates, and lifting handles in casing, and blind nuts and nut plates in base. However, general support maintenance may be called upon, at times, to perform any or all of the MAC items listed for organizational and direct support maintenance for rehabilitation or overhaul of an air conditioner.

6-3. DAMPER PARTS

See paragraph 5-15 for actuating cylinders and condenser air outlet damper linkage.

Preliminary procedures:

1. Remove condenser outlet grilles. (See para 4-26.)
2. Remove actuating cylinder access cover. (See para 4-20.)
3. Remove lower front panel. (See para 4-25.)

NOTE

Figure 6-1 shows breakdown of right side damper facing the rear. The left side parts are installed opposite to breakdown shown.

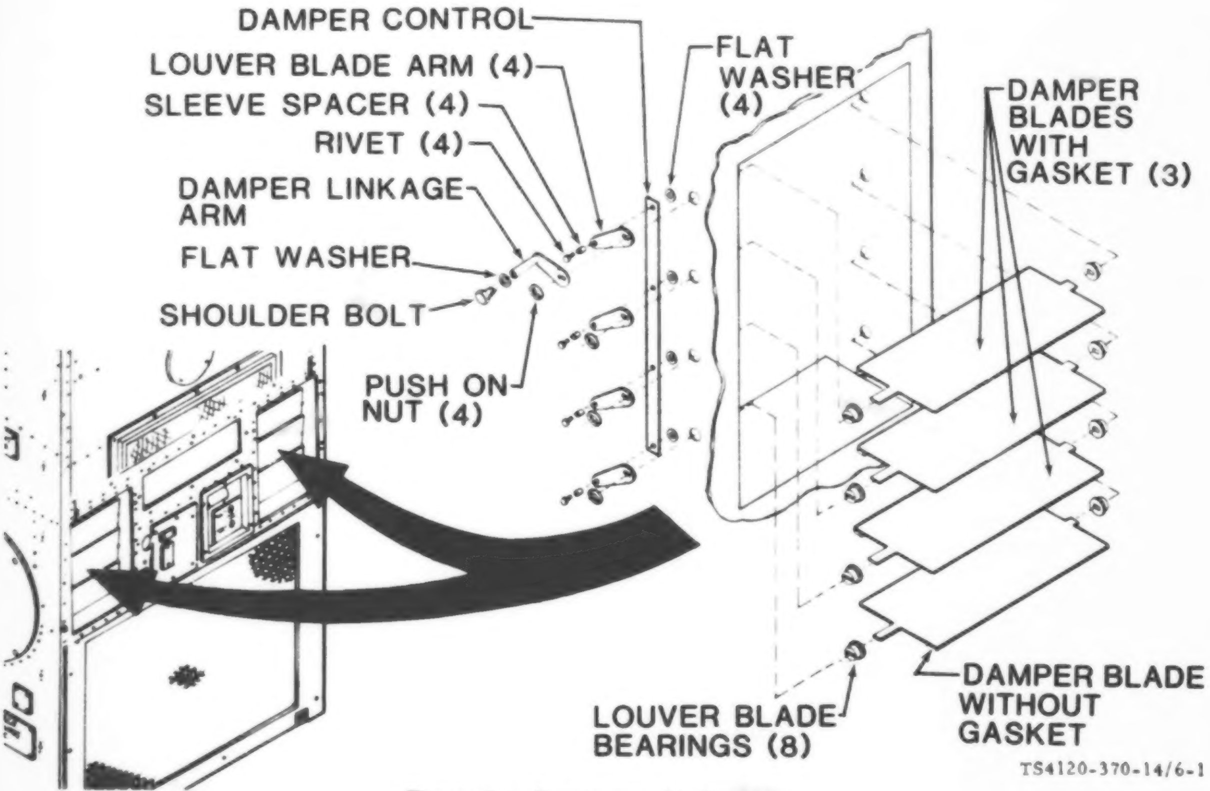

DAMPER CONTROL
LOUVER BLADE ARM (4)
SLEEVE SPACER (4)
RIVET (4)
DAMPER LINKAGE ARM
FLAT WASHER
SHOULDER BOLT
PUSH ON NUT (4)
FLAT WASHER (4)
DAMPER BLADES WITH GASKET (3)
LOUVER BLADE BEARINGS (8)
DAMPER BLADE WITHOUT GASKET
TS4120-370-14/6-1

Figure 6-1. Condenser Air Dampers

a. Inspection

(1) Check for loose, missing, or broken parts. Repair loose parts and replace missing or broken parts.

(2) Check that damper blades are not bent, dented, or otherwise damaged. Straighten or replace damaged blades.

(3) Check that gaskets are not loose or missing from upper three blades.

b. Removal

(1) Remove push on nuts from ends of damper blades.

(2) Using wrench, remove shoulder bolt and flat washers from damper linkage arm. This is the attachment point for the actuating cylinder.

(3) Carefully flex the damper blades enough to free the shorter tab end located toward the outer walls.

(4) Remove damper blades and bearings.

(5) If disassembly of the linkage parts is required, use a drill bit slightly smaller than the body diameter of the rivet. Drill the rivets out and remove remaining parts.

c. Installation

(1) If linkage parts were disassembled, bench assemble the linkage items that rivet together prior to installation. If linkage parts were not disassembled, go to step (6).

(2) Insert sleeve spacers through damper control and louver blade arms.

(3) Place rivet through hole in sleeve spacer and slip washer over end of rivet.

(4) Carefully head the rivet. Check that louver blade arm swings freely on rivet pivot point.

(5) Attach remaining louver blade arms repeating steps (2) through (4).

(6) Place louver blade bearings in holes in fan outlet.

NOTE

The top three damper blades have gaskets. The bottom one does not.

(7) Place the damper blade into the outlet opening. Insert the longer tab end through the slot in the inner bearing. Carefully flex the damper blade enough to insert the short tab end through the slot in the outer bearing.

(8) Place the slotted ends of the louver blade arms onto the tab end of the damper blade. Place the damper linkage arm (actuator link) on the top blade tab.

(9) Secure linkages to damper blades with push on nuts.

(10) Check that dampers operate properly.

(11) Aline damper linkage arm with slot in actuator cylinder end and connect with shoulder bolt and flat washer.

Follow-on procedures:

1. Install lower front panel. (See para 4-25.)
2. Install actuating cylinder access cover. (See para 4-20.)
3. Install condenser outlet grilles. (See para 4-26.)

6-4. BLIND NUTS AND NUT PLATES

a. To replace blind nuts (rivnuts) use a drill bit slightly smaller than the body of the blind nut.

(1) Carefully drill the old blind nut out.

(2) Install replacement part.

b. To replace nut plates, use a drill bit slightly smaller than the body of the rivets securing the nut plate.

(1) Carefully drill the rivets lose.

(2) Remove the old nut plate.

(3) Install new nut plate with properly sized rivets.

6-5. LIFTING RINGS

Preliminary procedure: Remove top panel. (See para 4-24.)

a. Removal

(1) Using a drill bit slightly smaller than the rivet diameter, drill out eight blind rivets.

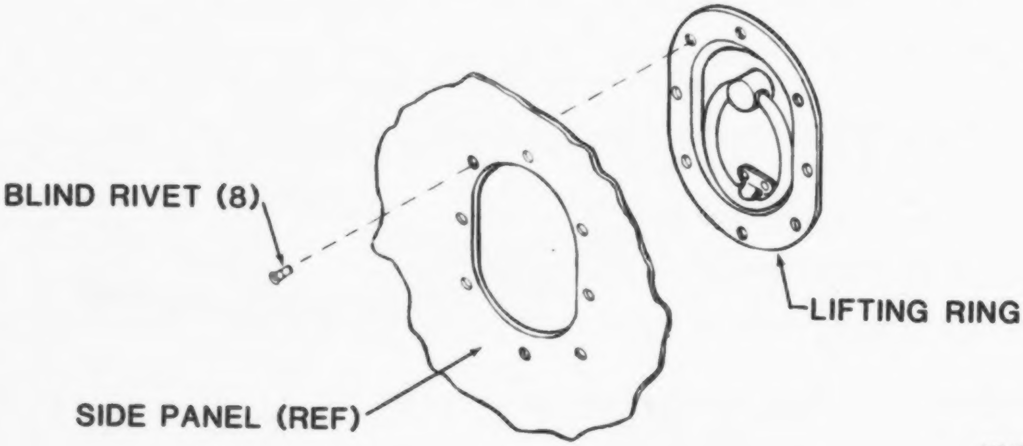
(2) Remove lifting ring.

b. Installation

(1) Place lifting ring on inside face of side panel and aline holes.

(2) Secure each lifting ring with eight blind rivets.

Follow-on procedure: Install top panel. (See para 4-24.)



TS4120-370-14/6-2

Figure 6-2. Lifting Rings

APPENDIX A

REFERENCES

A-1. SCOPE

This Appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A-2. FORMS

Recommended Changes to DA Publications	DA Form 2028-2
Equipment Inspection and Maintenance Work Sheet	DA Form 2404
Quality Deficiency Report	SF 368

A-3. FIELD MANUALS

Electric Motor and Generator Repair	FM20-31

A-4. MANUALS

Hand Portable Fire Extinguishers Approved for Army Users	TB5-4200-200-10
Radio Interference Suppression	TM11-483
The Army Maintenance Management System	TM38-750
Painting Instructions for Field Use	TM43-0139
Hand Receipt Manual	TM5-4120-370-14-HR
Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List	TM5-4120-370-24P
Administrative Storage of Equipment	TM740-90-1
Procedures for Destruction of Equipment to Prevent Enemy Use	TM750-244-3
Leak Detector, Refrigerant Gas	TM9-4940-435-14

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I INTRODUCTION

B-1. GENERAL

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination (e.g. by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the third position code of the SMR code.

i. Repair. The application of maintenance services[1], including fault location/troubleshooting[2], removal/installation and disassembly/assembly[3] procedures, and maintenance actions[4] to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

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[1] Services—Inspect, test, service, adjust, aline calibrate, and/or replace.

[2] Fault locate/troubleshoot—the process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

[3] Disassemble/assemble—encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e., assigned an SMR code) for the category of maintenance under consideration.

[4] Actions—welding, grinding, riveting, straightening, facing, remachinery, and/or resurfacing.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00".

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific task identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

C	Operator or Crew
O	Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

B-5. EXPLANATION OF COLUMNS IN SECTION IV

a. Column 1, Reference Code. The code recorded in Column 6, Section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

APPENDIX B

Section II

MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools & Equipment	(6) Remarks
			C	O	F	H	D		
01	COVERS, PANELS, GRILLES, SCREENS, AND INFORMATION PLATES								
	Covers	Inspect	0.1						
		Service		0.2					
		Repair			2.0				A
		Replace			0.5				
	Panels	Inspect	0.1						
		Service		0.2					
		Repair			2.0				A
		Replace			0.5				
	Grilles	Inspect	0.1						
		Adjust	0.1						
		Service	0.2	0.2					
		Repair			2.0				B
		Replace			0.5				
	Information Plates	Inspect	0.1						
		Service	0.1						
		Replace			0.3				
02	AIR CIRCULATING AND CONDENSATE DRAIN SYSTEMS								
	Air Filters	Inspect		0.5					
		Service		1.0					
		Replace		0.5					
	Mist Eliminator	Inspect		0.7					
		Service		1.0					
		Replace		0.7					
	Condensate Trap	Inspect		0.5					
		Service		0.8					
		Replace		0.7					
	Fresh Air Damper	Adjust	0.1						
		Service		0.5					
		Repair		1.0					
		Replace		2.0					

APPENDIX B

Section II

MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER (cont.)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools & Equipment	(6) Remarks
			C	O	F	H	D		
03	ELECTRICAL								
	Control Panel and Components	Inspect	0.1						
		Adjust	0.1						
		Test		1.0					
		Repair		2.0					
		Replace		1.0					
	Block-Off Assembly	Inspect	0.1						
		Service	0.1						
		Replace		0.5					
	Wiring Harnesses	Inspect		1.0					
		Test		1.0					
		Repair		2.0					
		Replace		4.0					
	Junction Box and Components	Inspect		0.5					
		Service		0.2					
		Test		2.0					
		Repair		4.0					
		Replace		2.0					
04	EVAPORATOR FANS, MOTORS, AND HEATERS								
	Fans	Inspect		1.0					
		Service		0.1					
		Replace		1.0					
	Motors	Inspect		1.0					
		Service		0.1					
		Test		0.2					
		Repair			2.0				C
		Replace		1.0					
	Heater Thermostat	Inspect		1.0					
		Test		0.3					
		Replace		0.5					
	Heater Element	Inspect		1.0					
		Test		0.3					
		Replace		1.0					

APPENDIX B

Section II

MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER (cont.)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools & Equipment	(6) Remarks
			C	O	F	H	D		
05	CONDENSER FANS AND MOTOR								
	Fans	Inspect		1.0					
		Service		0.2					
		Replace		1.0					
	Motor	Inspect		1.0					
		Test		0.2					
		Repair			2.0				C
		Replace		1.0					
06	REFRIGERATION SYSTEM								
	Actuating Cylinders	Inspect			0.5				
		Adjust			1.0				
		Replace			6.0				
	Safety Control Box								
	Pressure Switches	Test			1.0				
		Replace			6.0				
	Circuit Breaker	Inspect		0.1					
		Test		0.3					
		Replace		0.3					
	Service Valves	Inspect			0.1				
		Replace			6.0				
	Compressor	Test			1.0				
		Repair			2.0				D
		Replace			8.0				
	Liquid Indicator	Inspect	0.1						
		Service	0.1						
		Replace			6.0				
	Expansion Valve	Test			1.0				
		Adjust			2.0				
		Replace			6.0				
	Evaporator Coil	Inspect		1.0					
		Service		2.0					
		Replace			7.0				

APPENDIX B

Section II

MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER (cont.)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools & Equipment	(6) Remarks
			C	O	F	H	D		
06 (cont.)	Pressure Regulator Valve	Test			0.5				
		Adjust			1.0				
		Replace			6.0				
	Solenoid Valves	Test			1.0				
		Repair			1.0				E
		Replace			6.0				
	Quench Valve	Test			1.0				
		Adjust			2.0				
		Replace			6.0				
	Dehydrator	Inspect			1.0				
		Replace			6.0				
	Receiver	Inspect			0.3				
		Replace			6.0				
	Pressure Relief Valve	Inspect			0.3				
		Replace			6.0				
	Condenser Coil	Inspect		1.0					
		Service		2.0					
		Replace			7.0				
	Tubing and Fittings	Inspect			1.0				
		Test			2.0				
		Replace			6.0				
07	CASING AND BASE								
	Insulation	Inspect			1.0				
		Replace			1.0				
	Casing	Inspect				0.5			F
		Repair				2.0			F
		Replace				2.0			
	Base	Inspect				0.2			
		Replace				6.0			
08	SOUND ATTENUATOR								
	Sound Attenuator	Inspect		0.2					
		Service		1.0					
		Repair			2.0				B
		Replace			0.5				

APPENDIX B

Section III TOOL AND TEST EQUIPMENT REQUIREMENTS

MAINTENANCE ALLOCATION CHART

(1) Tool/Test Equip. Ref. Code	(2) Mainten-ance Category	(3) Nomenclature	(4) National/NATO stock number	(5) Tool number
		No special tools and test equipment required. Standard tools and test equipment in the following kits are adequate to accomplish the maintenance functions listed in Section II:		
1	O-F-H	Tool kit, service, refrigeration unit (SC 5180-90-CL-N18)	5180-00-597-1474	(19099) SC 5180-90-CL-N18
2	O-F-H	Soldering Gun Kit	3439-00-930-1638	(11103) 450K4
3	F-H	Pump, Vacuum	4310-00-098-5272	(64484) 1400B
4	F-H	Leak Detector	4940-00-531-0362	(16734)200

APPENDIX B

Section IV REMARKS

MAINTENANCE ALLOCATION CHART

Reference code	REMARKS
A	Replace gasket and insulation only
B	Replace gasket only
C	Replace bearings and electrical connectors only
D	Replace external components only
E	Replace coil only
F	Replace insulation damper parts, blind nuts, plate nuts, and lifting handles only.
	Other than those items listed above, there are no supplemental instructions or explanatory remarks required for the maintenance functions listed in Section II. All functions are sufficiently defined in Section I. Active time listed for maintenance task functions are with the air conditioner in off-equipment position.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I INTRODUCTION

C-1. SCOPE

This appendix lists Components of End Item and Basic Issue Items for the air conditioner to help you inventory items required for safe and efficient operation.

C-2. GENERAL

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the air conditioner in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the air conditioner during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

C-3. EXPLANATION OF COLUMNS

The following provides an explanation of columns found in the tabular listings:

a. Column (1)—Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

b. Column (2)—National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Column (3)—Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

d. Column (4)—Unit of Measure (U/M). Indicates the measure used in performing the actual operation/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5)—Quantity required (Qty rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

Section II COMPONENTS OF END ITEMS

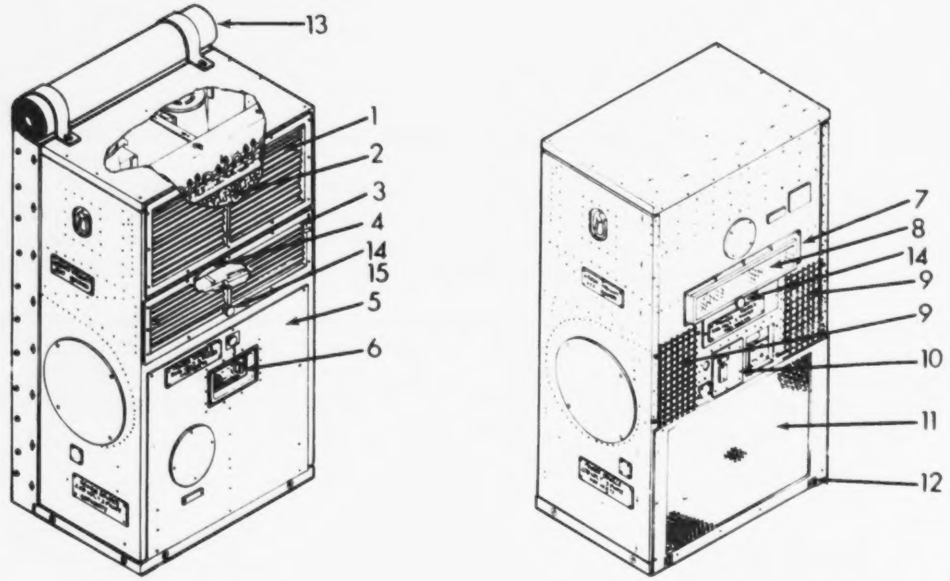
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Figure C-1. Components of End Item

(1) ILLUS. NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM and Part number	USABLE ON CODE	(4) U/M	(5) QTY rqr
1		GRILLE, METAL (97403) 13214E3931		EA	1
2		MIST ELIMINATOR (97403) 13225E8119		EA	1
3		GRILLE, METAL (97403) 13214E3937		EA	1
4		FILTER, AIR CONDITIONING (97403) 13214E3972-2		EA	1
5		PANEL, LOWER (97403) 13225E8089		EA	1
6		CONTROL PANEL ASSEMBLY (97403) 13225E8073		EA	1
7		FRAME, FILTER (97403) 13225E8106		EA	1
8		FILTER, AIR CONDITIONING (97403) 13214E3972-1		EA	1
9		GRILLE, CONDENSER OUTLET (97403) 13225E8117		EA	2
10		COVER, SERVICE VALVES (97403) 13225E8133		EA	1
11		GUARD, CONDENSER COIL (97403) 13225E8101		EA	1
12		PLUG, PIPE (97403) 13211E8178		EA	8
13		COVER, AIR CONDITIONER (97403) 13225E8159		EA	1
14		KNOB (97403) 13214E3889		EA	2
15		EXTENSION ROD (97403) 13225E8108		EA	1

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Section III BASIC ISSUE ITEMS

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION FSCM & PART NUMBER	USABLE ON CODE	(3) U/M	(4) QTY AUTH
7520-00-559-9618	COTTON DUCK CASE		EA	1

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

Section I INTRODUCTION

D-1. SCOPE

This appendix lists additional items you are authorized for the support of the air conditioner.

D-2. GENERAL

This list identifies items that do not have to accompany the air conditioner and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

D-3. EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TDA, or JTA) which authorized the item(s) to you.

Section II ADDITIONAL AUTHORIZATION LIST

NOT APPLICABLE

APPENDIX E

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I INTRODUCTION

E-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the Air Conditioner. These items are authorized to you by CTA50-970, Expendable items (except Medical, Class V, Repair Parts, and Heraldic Items).

E-2. EXPLANATION OF COLUMNS

a. Column (1)—Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use coater, item 1, Appendix E").

b. Column (2)—Level. This column identifies the lowest level of maintenance that requires the listed item.

C—Operator/Crew
O—Organizational Maintenance
F—Direct Support Maintenance
H—General Support Maintenance

c. Column (3)—National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4)—Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5)—Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II

EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) NATIONAL STOCK NUMBER	(4) Description	(5) U/M
1	0	4130-00-860-0042	Coater, Air Filter, 1 pint container	ea
2	F	3040-00-664-0439	Adhesive, General Purpose, 1 pint container	ea
3	F		Solder, Lead-Tin, QQ-S-571, Type SN60WRP2	
4	F	6830-00-292-0732	Nitrogen	cy
5	F		Brazing alloy, silver, QQ-B-654, grade O, I, or II	oz
6	F		Brazing alloy, silver, QQ-B-654, grade III	oz
7	F	3439-00-640-3713	Flux, brazing O-F-499, type B	oz
8	F	5350-00-192-5047	Abrasive cloth	pg
9	F	7920-00-205-1711	Rags	pg
10	F	6850-00-837-9927	Monochlorodifluoromethane, Technical: w/cylinder 22 lb (Refrigerant-22) BB-F-1421, type 22 (81348)	cy
11	F	6830-00-872-5120	Trichloromonofluoromethane Technical: w/cylinder 50 lb (Refrigerant-11) BB-F-1421 Type II (81348)	cy
12	F		Tape, Insulation, 13219E9543 (97403) 165 (77464)	roll
13	F	8030-00-889-3534	Tape, Antisieze, Polytetrafluroethylene MIL-T-27730, size 1	roll
14	F		Lubricating Oil, VV-L-825, type IV	qt
15	F	9150-00-058-2301	Oil, Vacuum pump, Duo-seal	qt
16	O	3439-01-045-7940	Flux, Solder, Liquid, Rosin Base MIL-F-14256	qt
17	F		Plastic Material, Form T, ¾ ID x ½ Wall, (Tubing Insulation) MIL-P-15280	ft

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X, Y, Z
NONE

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

DISTRIBUTION:
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CO A, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

DATE SENT

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TM 5-4120-370-14	16 Mar 83	Air Conditioner, Vertical, Compact

BE EXACT. PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 Cylinders. The engine on my set only has 4 Cylinders. Change the manual to show 4 Cylinders.
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.
125	line 20			I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C